

AI AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

FEBRUARY 15, 1951

In This Issue . . .

Aluminum Cylinders Without Liners

Features of Nash Hoolley Sports Car

Oriflow Shock Absorbers in Production

Economics of Propane as Engine Fuel

Modern Facilities for Rambler Body

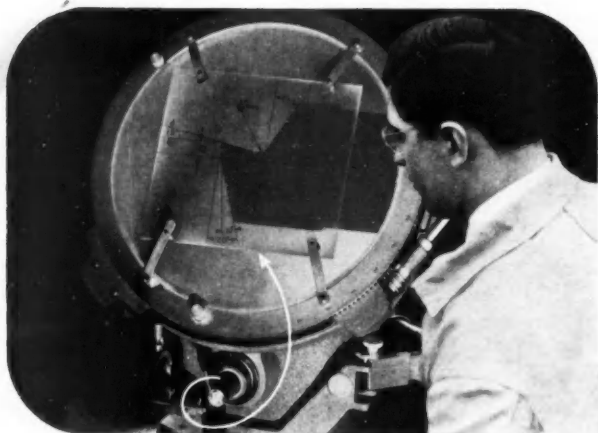
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A C H I L T O N P U B L I C A T I O N

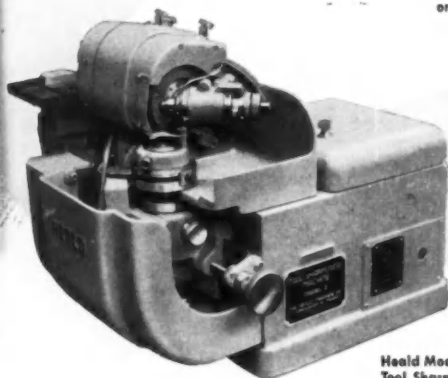
This "SCREEN TEST"

shows how to get peak performance
from your Heald Bore-Matics

... by sharpening
your cutting tools
automatically on a
Heald Model 2
Tool Sharpener



Comparator proves that exact reproduction of tool shapes can be obtained only by automatic lapping on a Heald Tool Sharpener.



Heald Model 2
Tool Sharpener

WHERE schedules call for the maximum in both precision and production, it pays to take a good look at your borizing tools.

Are they being lapped by hand, with the possibility of human errors in the duplication of the required shape—and with microscopically irregular edges? If so, you can get

- TOOLS LAST 2 TO 4 TIMES LONGER
- MORE WORKPIECES PER SHARPENING
- LESS MACHINE DOWN TIME

higher sustained production, with increased precision and better finish, by using the Heald Model 2 Tool Sharpener.

This machine sharpens any borizing or cutting tool automatically—produces sharp, flawless cutting edges, and consistently duplicates the exact tool shape required, over and over again! Up to five different angles plus the radius may be preset on precisely calibrated scales, the tool inserted in the holder—and that's all there is to it. Operation is fully automatic, eliminating the possibility of human error.

Your nearest Heald representative will be glad to give you complete information on this time-saving, cost-cutting Tool Sharpener. Remember—when it comes to precision finishing, it pays to come to Heald.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

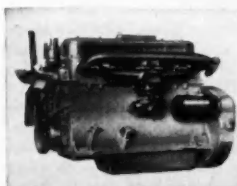


Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

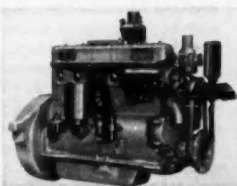
265 cu. in. to 3520 cu. in.

GASOLINE • DIESEL

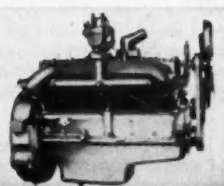
WAUKESHA ENGINES



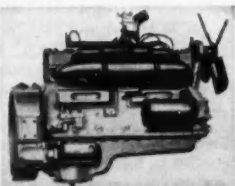
265 cu. in. Gasoline



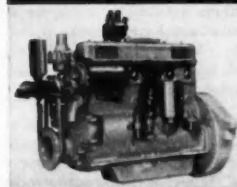
320 cu. in. Gasoline



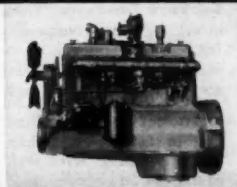
320 cu. in. Gasoline



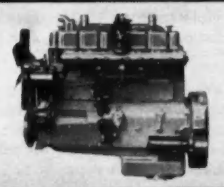
404 cu. in. Gasoline



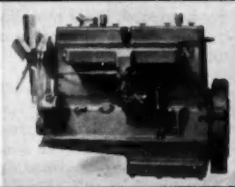
426 cu. in. Gasoline



525 cu. in. Gasoline



779 cu. in. Gasoline



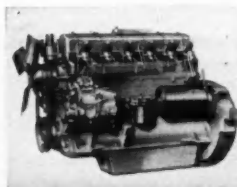
1197 cu. in. Butane

DEPENDABLE POWER for

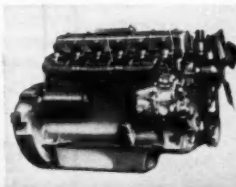
Trucks • Buses • Tractors • Fire Trucks
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 Pumps • Electrical Machinery
 Oil Fields • Industrial Equipment
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 ... and many other heavy-duty requirements

Send for **DESCRIPTIVE BULLETINS** on any or all of these engines or consult *Waukesha Engineers* on your power needs.

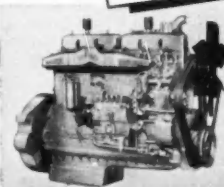
Max. HP. and RPM	Cylinders	Bore and Stroke, In.	Diapl. Cu. In.
GASOLINE ENGINES			
66 @ 2400	6	3 1/4 x 4	265
122 @ 3000	6	4 1/8 x 4	320
104 @ 3000	6	4 1/8 x 4 1/4	404
128 @ 2800	6	4 1/8 x 5	426
141 @ 2800	6	4 1/8 x 5	451
150 @ 2800	6	4 1/8 x 5 1/8	525
172 @ 2600	6	4 1/8 x 5 1/4	554
188 @ 2600	6	5 1/8 x 6	779
224 @ 2100	6	5 1/8 x 6	817
221 @ 2000	6	6 1/4 x 6 1/4	1197
*300 @ 1800	6		
*Butane engine			
DIESEL ENGINES			
88 @ 2400	6	3 1/4 x 4	265
119 @ 2800	6	4 x 5	377
136 @ 2800	6	4 1/8 x 5	426
173 @ 1900	6	5 1/8 x 6	779
240 @ 1800	6	6 1/4 x 6 1/4	1197



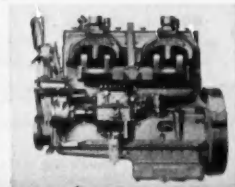
265 cu. in. Diesel



377 cu. in. Diesel



779 cu. in. Diesel



1197 cu. in. Diesel

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., NEW YORK, TULSA, LOS ANGELES

"K" MONEL and "KR" MONEL

Age-hardenable, non-magnetic alloys offering high strength, excellent corrosion-resistance and good working properties

Where stressed structural members must be placed close to sensitive electro-magnetic equipment, or where extra strength is needed in corrosive environments, these Inco Nickel Alloys offer solutions to the problems of metal selection.

Both alloys show *improved* strength and hardness at sub-zero temperatures. And both alloys provide moderate strength at temperatures to 900°F.

"K"® Monel and "KR"® Monel are similar in composition and properties. "KR" Monel has better machinability and is recommended for parts requiring intricate machining.

The principal engineering characteristics of these alloys are:

Tensile Properties: "K" Monel in the fully age-hardened condition has a minimum yield strength (0.2% offset) of 100,000 psi and a tensile strength of over 140,000 psi, with minimum elongations (in 2 in.) of 15% and 20% for cold-drawn and hot-rolled materials respectively. "KR" Monel, age-hardened, has a minimum yield strength (0.2% offset) of 90,000 psi with minimum elongation of 20% (in 2 in.) for as-rolled material.

Shear Strength: The shear strength of "K" Monel, as determined with .050-in. x .250-in. specimens subjected to double shear, is (full hard, age-hardened) 98,450 psi maximum, with 0.04 in. deflection. The shear strength of "K" Monel rivets, fully age-hardened, is 89,200 psi with ultimate tensile strength of 147,000 psi.

Spring Properties: "K" Monel wire can be cold-drawn and age-hardened to develop 160,000 to 200,000 psi tensile strength. The torsional proportional limit of cold-drawn, age-hardened wire is about 40% of the ultimate tensile strength.

Endurance Limit: In rotating beam tests of polished speci-

mens at room temperature and 10,000 r.p.m., "K" Monel (cold-drawn, age-hardened) showed an endurance limit for 10⁶ cycles of 41,000 to 59,000 psi.

Magnetic Characteristics: "K" and "KR" are non-magnetic under ordinary conditions and remain so at sub-zero temperatures.

Working Characteristics: Both "K" Monel and "KR" Monel may be hot-worked, forged, and cold-worked. "K" Monel may be readily machined in the annealed condition and may be considered commercially machinable at practical rates in other conditions with Brinell hardness of up to 275. "KR" Monel, because of higher carbon content and special thermal treatment, has better machinability than "K" Monel and is recommended for parts requiring more intricate machining. Because of greater hardness, both alloys will take a higher polish than Monel. Both may be joined by the usual welding, brazing, and soldering processes.

Corrosion Resistance: These alloys are highly resistant to attack by most commonly-encountered corrosives, including mineral and organic acids, alkalies, salts, potable and industrial waters, foods, organic compounds, and oxidizing atmospheres at normal and elevated temperatures.

Forms Produced: "K" Monel is supplied in most commonly-used mill forms—rods, hexagons, squares, flats, strip, sheet, seamless tubing, wire, welding materials—and in a variety of finishes and conditions. "KR" Monel is produced in rods, hexagons, squares, hot-rolled and cold-drawn.

Applications: Because these alloys retain their non-magnetic, corrosion-resistant, and high physical qualities at abnormal temperatures, they have been used to advantage in aviation instruments, roller chains for retractable landing gear, controls, springs and contact arms in electrical equipment, in stressed structural members and fastenings.

"K" MONEL
Effect of temperature on physical properties
(Age-hardened condition)

Test Temperature °F.	Yield Strength (0.2% offset) psi.	Tensile Strength psi.	Elongation in 2 in. per cent	Creep Strength (0.10% in 10,000 hr.) psi.	Hardness (Brinell)	Impact (Charpy) ft.-lb.
-300	160,200	202,000	27	...	...	...
-110	134,600	171,550	17.3	...	36 (Rock. C)	27
Room	111,000	160,000	23.5	...	331	27
200	108,000	150,000	23.5	...	...	...
400	103,000	149,000	24	...	...	...
600	105,000	146,000	23	...	...	...
750	...	...	...	67,000	...	...
800	105,000	124,000	8.5	48,000	302	...
1000	92,000	95,000	3	8,500	255	...
1100	...	...	...	...	229	...
1200	80,000	80,000	1.5	...	...	...
1400	30,000	45,000	8	...	...	...

FURTHER DATA AVAILABLE

A 23-page reference manual, *Engineering Properties of "K" Monel and "KR" Monel*, contains all essential engineering information on these alloys. It is available, free, for your files.

For help on specific metal problems involving corrosion, high temperatures, or fatigue, write directly to Inco's Technical Service, outlining your problems.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE
NICKEL INCO ALLOYS
TRADE MARK

MONEL® • "B"® MONEL • "K"® MONEL •
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INCONEL® • INCONEL "X"®

AUTOMOTIVE INDUSTRIES

February 15, 1951

Published Semi-Monthly

Vol. 104, No. 4

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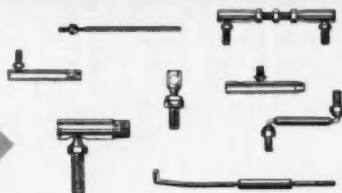
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AUTOMOTIVE INDUSTRIES, February 15, 1951

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AND QUALITY
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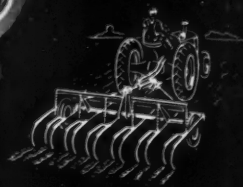


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for Modern
Labor-Saving Devices*



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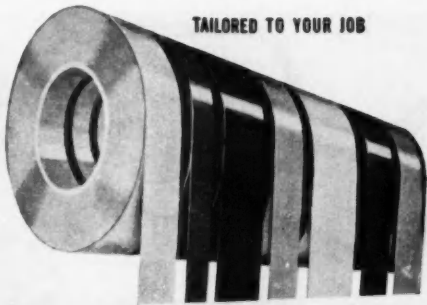
Pump Division



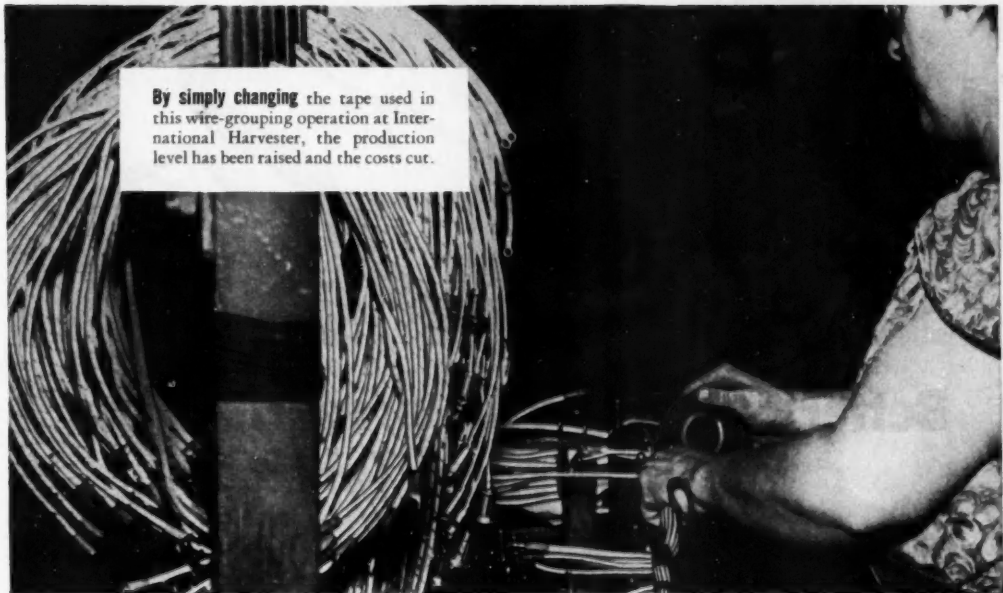
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THE NEW Polyken® INDUSTRIAL TAPES

TAILORED TO YOUR JOB



By simply changing the tape used in this wire-grouping operation at International Harvester, the production level has been raised and the costs cut.



Harnessing the "heart" of the horsepower

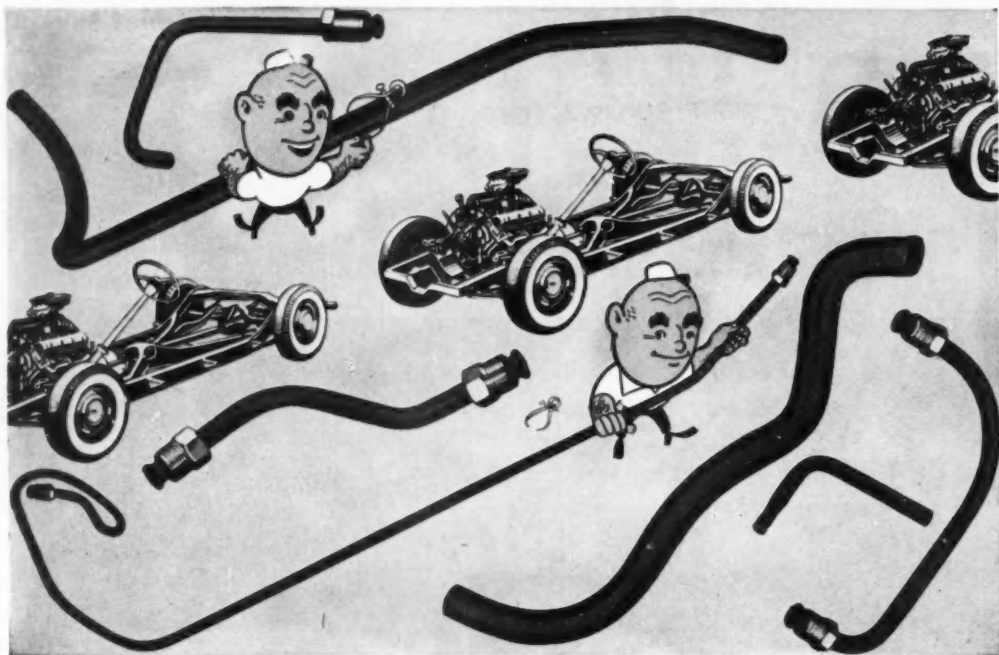
At International Harvester Company's Springfield Works there is one operation where production has been upped approximately 10%. Simply by changing the tape used on "harness wrapping" from ordinary friction tape to Polyken Industrial Tape No. 163 International stepped up production—cut down costs.

Polyken Industrial Tape No. 163 adheres more readily to most surfaces and handles more easily. In addition, the adhesive is not messy—does not come off on the operator's hands—therefore production is kept at a constant high level.

International also uses less Polyken No. 163 than ordinary friction tape because of its high adhesion factor. This, plus the fact that No. 163 is cheaper than many friction tapes, has resulted in the appreciable reduction in operation costs for them.

FREE SAMPLES. Write today for complete specifications and engineering data, plus samples of Polyken No. 163. Address Polyken, Dept. AIB, 222 West Adams Street, Chicago 6, Illinois.

Polyken Industrial Tape, Department of Bauer & Black, Division of The Kendall Company



Better lines for your production line with Bundyweld Tubing!

BETTER for smoother production, for finer performance in your cars.

Your automotive tubing units, fabricated at Bundy, are formed exactly to specification, checked and double checked by our crews, then shipped direct, on time and *right*, to your assembly lines. If you prefer, Bundy-

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Either way, Bundyweld helps reduce rejects, avoid production delays, lower costs for you. It's extra strong, yet ductile, too. It bends more readily and takes more bending with no danger

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Just double check Bundyweld's twenty-year reputation as the preferred tubing wherever motor-powered vehicles roll on wheels. Then, for the full story of amazing Bundyweld, write:

Bundy Tubing Company, Detroit 14, Mich.

Bundyweld Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Bonding metal fuses with basic metal, presto—



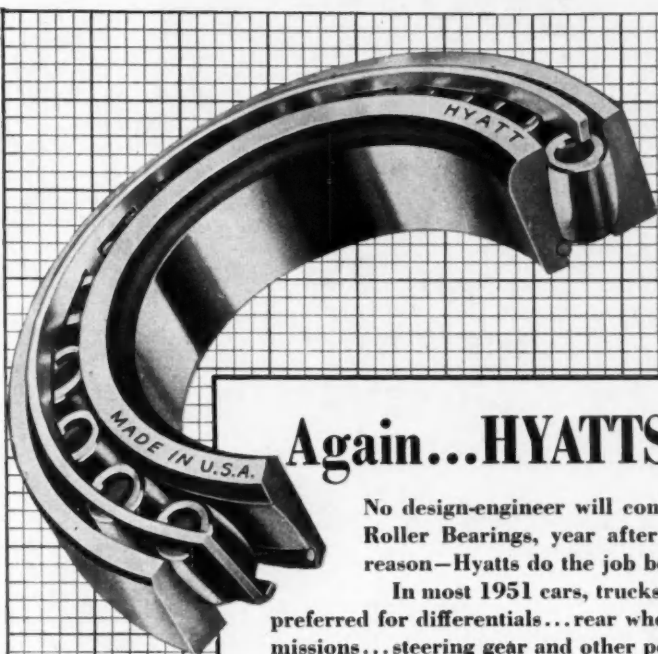
Bundyweld . . . double-walled and brazed through 360° of wall contact.



NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

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Again...HYATTS preferred

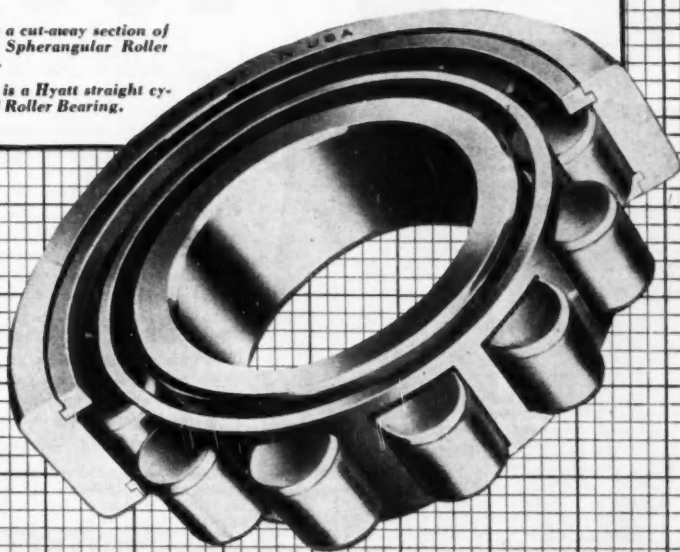
No design-engineer will continue to specify Hyatt Roller Bearings, year after year, except for one reason—Hyatts do the job better.

In most 1951 cars, trucks, and buses, Hyatts are preferred for differentials...rear wheels...pinions...transmissions...steering gear and other positions.

The 1951 models have one thing in common with cars and trucks of the early nineties, Hyatts are used now as then, for reliable performance. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J., Detroit, Mich.

Above is a cut-away section of a Hyatt Spherangular Roller Bearing.

At right is a Hyatt straight cylindrical Roller Bearing.



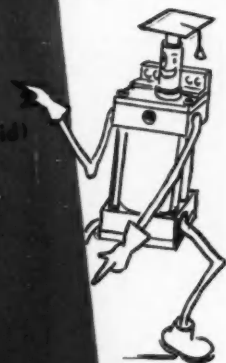
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**BOOST
80 PSI AIR**
(Input Range: 40 to 3000 psi Air or Fluid)

**TO ...
2000 PSI
HYDRAULIC
PRESSURE**

(Output Range: 200 to 10,000 psi Fluid)



with



Fluid Pressure **BOOSTERS**

From ordinary plant air line pressure, Miller Boosters produce hydraulic pressures (from 200 to 10,000 psi) for driving one or more hydraulic work cylinders simultaneously at from 30 to 450 strokes per minute. Ordinarily, the booster operates one stroke for each stroke of the operated work cylinders.

Used in place of conventional type hydraulic pumps, Miller Boosters, save space and weight, permit convenient portability and are easier and less costly to install, operate, and maintain. Also, they hold pressure indefinitely—without the motion and heat generation of ordinary pump circuits.

Used in place of air cylinders, the booster driven hydraulic work cylinder, which can do the work of an air cylinder ten times as large and heavy, saves space and weight at point of application of cylinder thrust—since the booster itself can be mounted separately—away from the hydraulic work cylinder—and either on or off the equipment or machine.

In many installations, the popular Miller Dual Pressure "Air Miser" Booster saves up to 95% of the air normally consumed by direct-driven air cylinders. A wide selection of sizes, pressure ratios and mounting styles are available for the first time at low cost on a normal delivery schedule because Miller Boosters are built up from stock Miller standard cylinder parts to eliminate costly designs, patterns and castings.

Full Details In Miller Bulletin B-200 Sent FREE On Request

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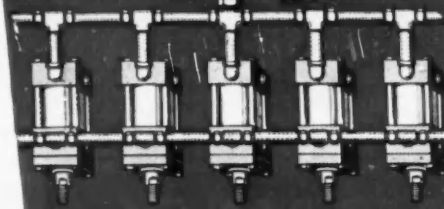
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SIMILAR
APPLICATIONS



Steering AT ITS BEST



C. D. BECK & COMPANY—MODEL DH-1000

ROSS BRINGS EASE . . . AND ECONOMY



UNIQUE DECK & HALF design features the new Transcontinental Model DH-1000 of C. D. Beck and Company, Sidney, Ohio. This distinguished new coach has many other outstanding features—including ROSS STEERING.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

- (1) Increased mechanical reduction . . . (2) More compactness . . . (3) Reduction in weight . . .
- (4) Greater arm angular-travel . . . (5) Improved metallurgy . . . (6) Increased efficiency.

Throughout 44 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Cam & Lever **STEERING**

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Your Insurance Against Complaints

JUST A FEW USES:

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- Isolating vibration
- Controlling temperature
- Reducing weight
- Excluding dust, grit, etc.
- Cushioning shock
- Filtering liquids
- Grinding and polishing gaskets, grommets, etc.
- Padding, packing, sealing

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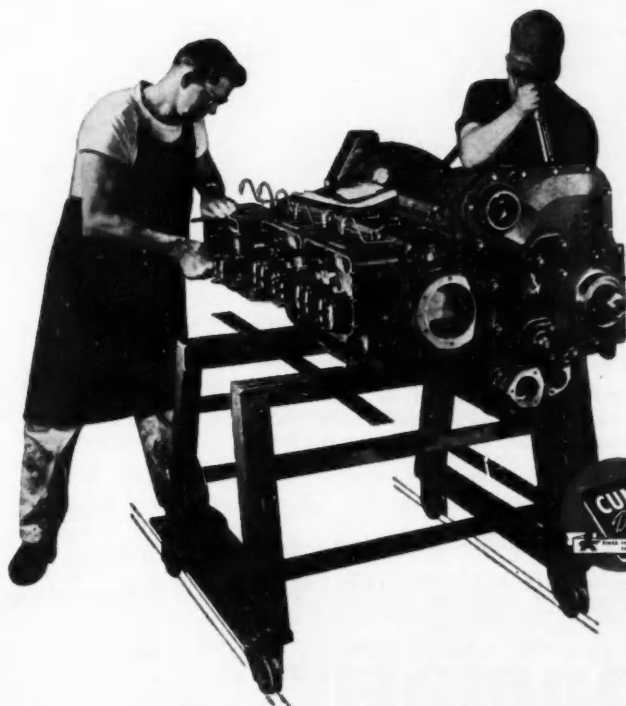
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*Built
not once
but
Twice*



**Extra care in building means
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Typical of the extra care that goes into the building of *every* rugged, dependable Diesel is the tear-down of the engine after assembly. First the engine is run in on the test block. Then it is completely torn down and carefully re-inspected. After that it is re-assembled and tested *again*.

Such *extra* care in precision craftsmanship is one of the reasons why Cummins engines have such an outstanding record in a wide range of applications. Cummins exclusive fuel system ... world-wide service and parts supply organization ... are other features that enable power users to make more profit with Cummins Diesels.

There's a model engineered to fit your power needs. Contact your Cummins dealer. He has more facts to show you.



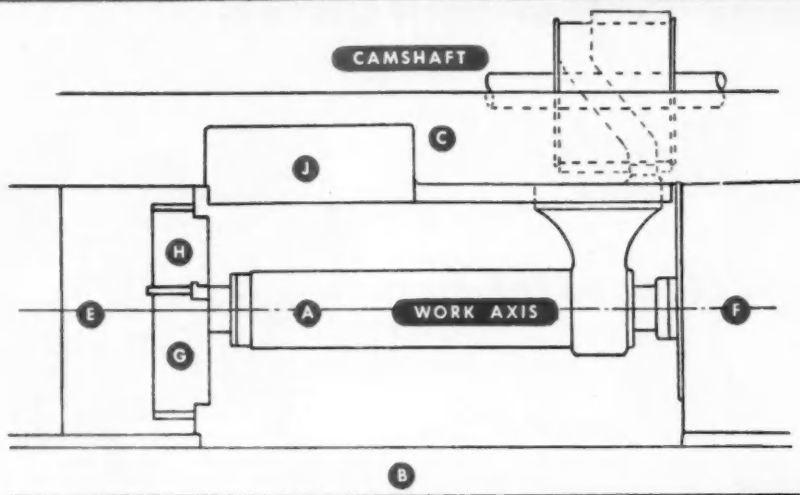
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CUMMINS ENGINE COMPANY, INC. - COLUMBUS, IND.

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Lightweight High-speed Diesel Engines (50-550 hp) for:
On-highway trucks • off-highway trucks • buses • tractors • earth-
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THE *good* THAT MEN DO

The horizontal design Tooling Area, shown above, is a contribution by Frank L. Cone to the improvement of the Multiple Spindle Automatic Bar Machine that will 'live' long after

him. The advantages, stated below, are made possible by the machine's Overhead Camshaft. Specific data invites comparison.

THE TOOLING AREA OF THE CONOMATIC (1½" Six Spindle):

1. Handles longer work than can be handled by the tooling area of any other "automatic."

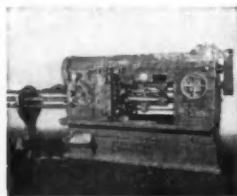
The length of the Tooling Area is 46⅞ ins., which permits standard machining operations on work up to 18 ins. in length from the face of the cut-off tool.

2. Is more strongly supported by the machine frame than is the tooling area of any other "automatic."

The stocky Uprights, E and F, which are shorter than those of other "automatics," are securely bolted to — and held between — the Top Bed, C, and Base, B, which are larger and heavier than such members of other "automatics." The Uprights are 22" high. The Top Bed is 8" high, 23" wide and 103¼" long. It weighs 1232 lbs. The Base is 33¾" high, 46" wide and 110" long. It weighs 6655 lbs.

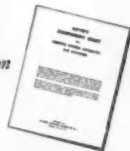
3. Provides more Tooling positions than does any other "automatic."

The Main End Slide, A, has 6 positions. The Main Cross Slides, G and H, front and rear, have 6, and the Auxiliary Cross Slide, J, front and rear, are 2 more, which make a total of 14.



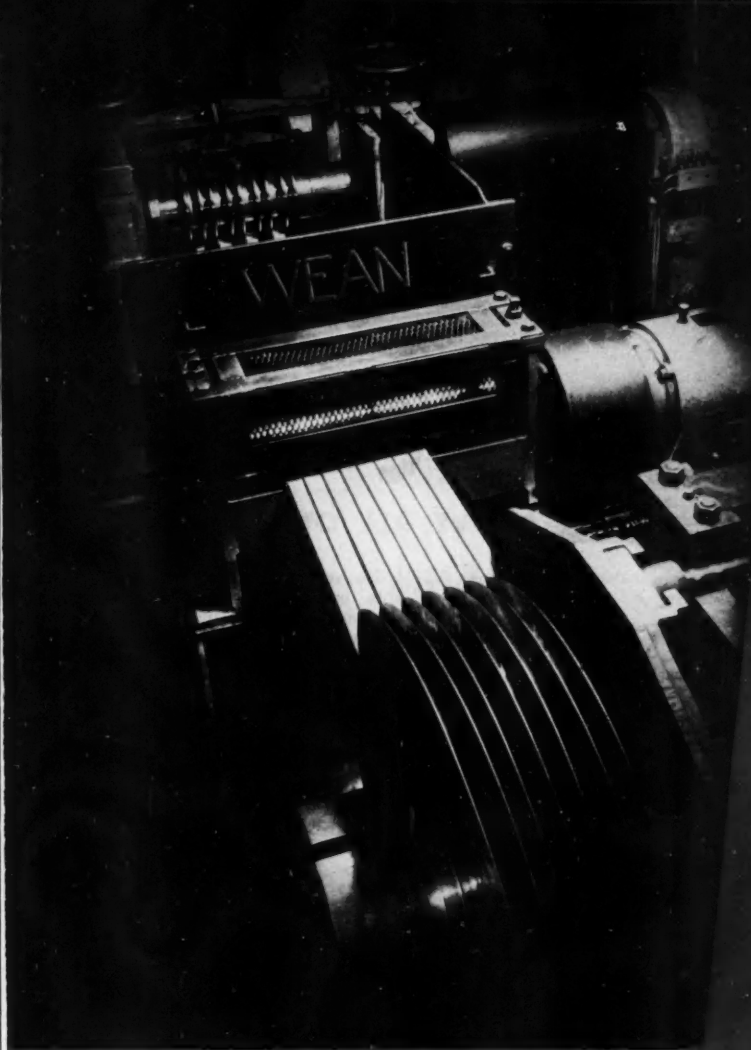
Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone



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CONE AUTOMATIC
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If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expen-

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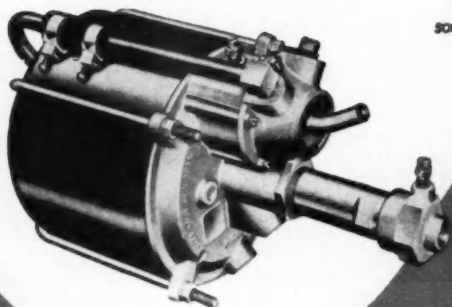
More than two million installations are certainly undeniable proof of any product's popularity. In the field of power braking it means that one—the Bendix Hydrovac—is preferred above all others. Such overwhelming acceptance by the men who service, drive and own the nation's trucks is impressive enough in itself. It further

suggests, however, that Hydrovac* power braking might very profitably be included as original equipment by most manufacturers. If you are interested in taking advantage of this great pre-sold market, write the factory direct for details on Hydrovac—the undisputed leader in power braking.

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AUTOMOTIVE INDUSTRIES

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High Spots of This Issue

★ Aluminum Cylinders Without Cast Iron Liners

The feasibility of chrome plating cylinder bores has been demonstrated by recent developments in Germany. This article traces research work along these lines, in both air-cooled and water-cooled cylinders. Page 32.

★ Nash Plant for Rambler Bodies

The new Rambler body plant at Kenosha contains almost four miles of conveyor systems in a modern two-story building. Here is done assembly and welding of the Rambler unit type structure, as well as paint, finish, and trim operations. Stampings used are purchased from outside sources. Page 34.

★ Propane as an Engine Fuel

There has been rapid increase in use of liquefied petroleum gases as engine fuels in the bus and truck fields. The author here explains advantages in cleanliness of operation, lessened overhauls, doubling of mileage between oil changes, etc., with LP fuels. Page 42.

★ Improved '51 Dodge Trucks

Herewith are covered major features of the new B-3 Series Dodge "Job-Rated" trucks for 1951. Increased horsepower, higher compression, twin carburetion on high tonnage models, improved brakes, and newly designed shock absorbers head the list. Page 46.

★ Extruded Stepped-Diameter Parts

Molloy Mfg. Co. of Detroit specializes in extruding of stepped-diameter parts such as transmission shafts, studs, and other formed automotive parts. With this interesting technique—producing to close tolerances—some parts can be made without scrap loss of basic material and without machining of any kind. See page 50.

★ 30 New Product Items

And Other High Spots, Such As:

Making Chrysler new Oriflow shock absorbers; silencing aircraft engines; the Nash Healey sports car; a planetary transmission with hydraulic control; and details on the 1951 Economy Run.

*News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3*

RYERSON STEELGRAMS



Swift-changing conditions in today's steel market are so difficult to follow—perhaps these few paragraphs will prove helpful.

Warehouse steel stocks were again recognized as vital to defense by the Government's NPA order which allots a share of "free tonnage" production to steel distributors. The regulation is helpful. However, even at this early stage, Rated Orders and special government programs have substantially reduced total "free tonnage" — reducing the share going to distributors proportionately.

We are doing everything possible to maintain reasonable stocks for warehouse buyers. But, as we see it at the moment, we shall have less steel to distribute among our many customers in the coming months. It will be helpful if you order only for immediate needs and extend DO ratings whenever possible.

More steel will be available in some specialized cases. Example: Ryerson stocks of aircraft alloys. New program gives Ryerson plants a range of more than 400 sizes, finishes and conditions of aircraft alloy bars and strip. Included are alloys for aircraft parts manufacturers, airframe makers and engine builders conforming to new MIL-S and to AMS specifications. Aircraft quality stainless stocks have also been enlarged.

More on stainless and alloys — Some steel users may not know that the Government is issuing a single set of MIL (Military) specifications to replace the different U. S. Army, Navy, Air Force, Air Force-Navy, and Federal specifications previously in effect. The new specifications for a few products have yet to be published, but Ryerson alloy and stainless stocks assure a warehouse source for all the important MIL "specs" now in effect and, as additional products are covered, Ryerson stocks will be immediately brought into line.

Ryerson tubing stocks, not affected quite as much as some products by the tight steel market, are being enlarged to include Rockrite tubing (with close I. D. tolerance and better I. D. finish for hydraulic cylinder applications) and pressure tubing to JIC "specs". Fairly adequate stocks of both are in prospect. This is in addition to seamless and welded mechanical tubing, extra heavy wall hot rolled tubing, structural tubing.

Changes on the nation's railroads are not confined to rolling stock, in railway shops alloy chain is finding increased acceptance as a replacement for wrought iron slings. Reasons are easy to find. The alloy chain packs three times the tensile strength of wrought iron. Lasts 5 to 15 times longer. Taylor Made Alloy chain, available from Ryerson, costs little or no more than wrought iron. It is widely used for overhead lifting in most all industries. Other types of chain also available for prompt shipment.

Wire rope, especially desirable where chain may cause damage, is currently available in a wide range of types and sizes. Shipment from Ryerson is prompt.

Availability of high tin content babbitt metal is threatened by the short tin supply. Not affected — Ryerson production of Glyco babbitt metal. Made by a special process, it has physical properties equal to those of high-tin babbitt, costs considerably less, and remains in good supply.

Indications are that metal fabricators contemplating purchase of machinery and tools should make an early decision on placing orders. Ryerson can still make fairly prompt shipment on many types, but demand is strong and delivery schedules are lengthening. All but lighter tools are currently offered on the basis of 5 to 8 months.

JOSEPH T. RYERSON & SON, INC. STEEL-SERVICE PLANTS: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
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News of the AUTOMOTIVE INDUSTRIES

Vol. 104, No. 4

February 15, 1951

January Vehicle Output 20% Under Last Fall

With the first month of 1951 production behind it, the automobile industry is off to a good start. When compared with production levels of September and October, the January showing was not exceptional, but nonetheless it was about 39,000 units ahead of the same month a year ago. Output in January had been estimated at about 625,000 units, compared with 586,739 cars and trucks in January, 1950. When com-

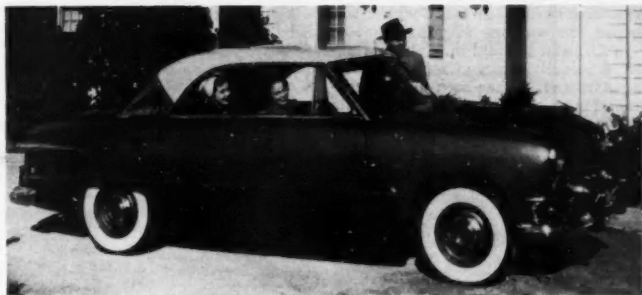
which the industry has escaped thus far because of the "lead" time factor.

War Tooling May Curb 1952 Model Work

Status of 1952 models is very much up in the air right now. While tool and die work is progressing rapidly, there is a possibility that an influx of war work might require so much of the machine tool and die capacity that 1952 model work would have to be shelved.

Ground Test Powerful New J-40 Jet Engine

Successfully completing ground tests that qualify it for quantity production, according to Navy and Westinghouse Electric Corp. spokesmen, the new J-40 jet, is claimed to be the world's most powerful turbo-jet engine. Said to use less fuel per pound of thrust than its predecessor, the J-34, an engine that powers some of the nation's fastest planes, the new engine was designed by Westinghouse engineers under the guidance of the Navy Bureau of Aeronautics. The thrust developed by the J-40 is reported to be equivalent to 14,000-hp at modern flight speeds. This is for a bare engine, without thrust augmentation.



FORD'S VICTORIA

This new Ford Victoria, which combines the sports appeal of a convertible with the advantages of a closed sedan has about 3000 sq in. of exposed glass area and side and rear quarter window roll down completely with no center post. A six-passenger sedan, it is powered by a 100-hp V-8 engine, and offers a choice of the conventional transmission, overdrive, or Fordomatic.

pared with the peak rate obtained in October, however, output in January was down about 20 per cent. The outlook for February is that production will not be up to the January level because of fewer working days and also because of major interruptions caused by the rail strike. It is expected, however, that on the basis of daily production when plants are running, output will be as high or possibly even higher than in January when some plants were making model changeovers. There is no definite information about what will happen in March, but there is a general feeling that production may start to slip during the month because of the impact of the restriction orders on metals

Oldsmobile to Introduce New "Super" 88 Model Soon

Oldsmobile will introduce soon, possibly in March, a new model to be known as the Super 88. The car will have a new body, essentially the same as is now used on the Buick Special, and will feature leaf springs at the rear and other suspension changes. It will be powered by the Rocket V-8 overhead valve engine. Thus, Oldsmobile will have three cars in its line, since the regular 88 will be continued. Dealers have been given prices on the new models, and it is understood that they average about \$75 higher than the regular 88.

Step-Up Automotive War Contracts

Defense contracts have been coming into the automotive industries at an accelerated rate. Included among recently-announced contracts are the following: Hudson will build the Wright R-3350 reciprocating aircraft engine for use in Navy aircraft and possibly also in the Fairchild C119 packet for which Kaiser-Frazer holds a \$200 million contract. Hudson will build the engines under a licensing agreement with Wright-Aeronautical Corp. ACF Brill Motors Co. has been awarded three separate contracts for buses totaling about \$19 million. American Car &

News of the AUTOMOTIVE

1950 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total Vehicles	
				1950	1949
First Quarter	1,342,803	294,135	851	1,637,489	1,379,703
Second Quarter	1,751,299	330,142	1,278	2,112,619	1,620,610
Third Quarter	1,994,678	351,714	1,777	2,347,667	1,964,583
Fourth Quarter	1,676,750	326,256	1,831	2,004,607	1,380,506
Total—Twelve Months	6,665,629	1,332,247	4,907	8,002,782	

1950 DOMESTIC TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and Less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-25,000	Over 25,000	Total
First Quarter	128,709	57,323	29,036	39,476	9,000	7,447	5,380	294,135
Second Quarter	156,072	65,209	21,510	46,122	11,630	10,427	7,876	360,142
Third Quarter	157,562	80,296	19,700	44,811	11,423	11,966	6,000	351,714
Fourth Quarter	137,411	61,182	14,747	37,740	10,623	12,354	7,979	326,256
Total—12 Mos., 1950	579,754	243,980	75,993	169,949	42,736	42,144	29,235	1,332,247
Total—12 Mos., 1949	419,255	250,035	70,969	135,604	28,396	19,780	17,351	1,129,625

* Automobile Manufacturers Association.

Foundry Co. has been given a letter order in the amount of \$53 million to establish production facilities and start manufacture of anti-aircraft motor gun carriages and spare parts. Total price of the contract is estimated at \$106 million. Caterpillar Tractor Co. has been awarded a \$42 million Army contract for machinery for the armed services engineers.

GM's GMC Truck & Coach Div. has been given a \$11.5 million order for military buses. It has also been revealed that a previous order of \$100 million for 2½-ton trucks has been increased to \$144 million. GM's Allison Div. has received the first production order for turbo-prop engines to be used in Naval aircraft. Buick will build an undisclosed number of cross-drive tank transmissions of the torque converter type. Tooling for the \$65 million order will begin immediately. GM's Aero-products Div. will build propellers for the Air Forces for use on the Fairchild C-119C cargo plane. Packard is expected to get a contract for production of the J-47 jet engine in Detroit. The Air Force has confirmed that it is negotiating with General Electric Co. and Packard on a contract. Packard has been given a \$3.5 million order for Diesel engines for the Navy. Twin Coach Co. of Kent, O., has a \$21.4 million order calling for production of 1650 convertible bus-truck units. It is understood that Fruehauf Trailer Co. will be a sub-contractor for much of the body work. With military orders of \$10 million for buses and of \$18 million for aircraft parts, total Twin Coach military commitment now approximates \$50 million.

Recent additions to Chrysler Tank commitments and new orders for tank engines have brought the company's total for these items to \$449 million. Con-

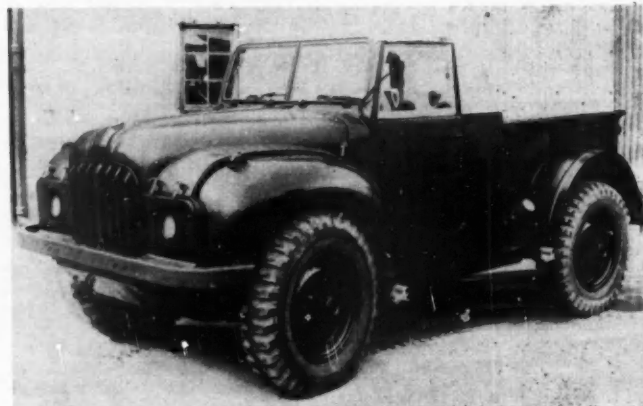
tracts for \$50 million worth of J-48 jet engines for the Navy and \$92 million worth of trucks bring the total of Chrysler's major contracts to \$591 million. It is understood that Chrysler will reopen the wartime Higgins plant in New Orleans to build tank engines under a recently-awarded contract. Boeing Airplane Co. has been given a contract for an undisclosed number of its lightweight gas turbine engines for the U. S. Navy Bureau of Ships. Ford has been given two additional contracts totaling \$71 million. One order for \$31 million will be for 29-passenger buses, pick-up and panel trucks and stake

trucks for the Army. Another contract in the amount of \$40 million has been granted for manufacture of 500-hp V-8 tank engines and additional spare parts.

The Air Force has announced allocation of \$24.7 million to two automotive companies for retooling and other preparations in advance of actual start of aircraft and aircraft engine production: Ford has been awarded \$14.7 million for tooling its aircraft plant in Chicago for output of Pratt & Whitney engines. Kaiser-Frazer has been allocated \$10 million for tooling its Willow Run plant for production of Fairchild C-119 transport planes. Federal Motor Truck Co. has been awarded contracts totaling \$10.2 million covering orders for heavy duty five-ton trucks, truck-tractors, and parts. The White Motor Co. was awarded a \$7 million contract by The Cleveland Ordnance District of the U. S. Army for engines for military vehicles. Pacific Airmotive Corp. received a \$4.6 million letter contract from the USAF for the overhaul of an undisclosed number of four-engine cargo-transport planes.

Pontiac Building New Sheet Metal Plant

GM's Pontiac Motor Div. has started construction of two new buildings as part of its multi-million dollar expansion program. The new sheet metal



COMBAT CARGO CARRIER

Ordered for the British armed forces, this new one-ton combat vehicle was designed jointly by the Ministry of Supply and the Rootes Group. To be used mainly as a cargo carrier in forward areas, the vehicle is equipped with a two-ton winch, has specially designed electrical equipment, and all four wheels are independently suspended. It is powered by a six-cyl engine.

INDUSTRIES

plant with 446,745 sq ft of space will be the second largest plant in the Pontiac set-up. It will be built adjacent to the plating plant to which it will be connected by an enclosed conveyor bridge. Fabricated sheet metal parts will be moved by conveyor from the plant directly to assembly lines, plating or painting operations, or to storage. The plant will be equipped with the latest overhead cranes, storage facilities and underground scrap conveyors. A new driveout and shipping building is also under construction. It will comprise more than 300,000 sq ft of space. The present driveout building is being razed and the steel salvaged for use in the new building.

Automotive Wholesalers Sold \$2641 Million in 1948

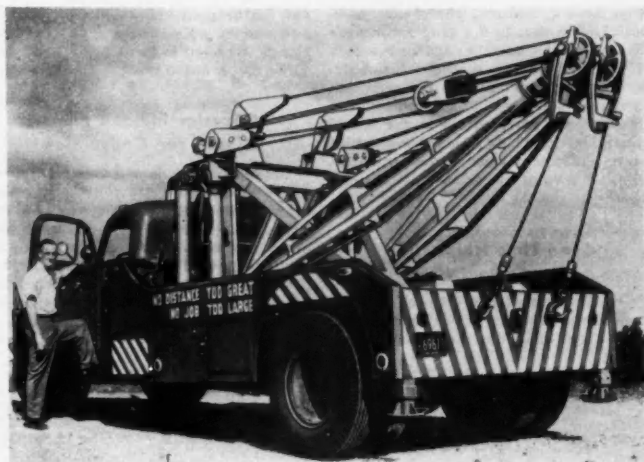
Sales of wholesalers of automotive accessories, parts, tires, and equipment in 1948 were more than four times the dollar volume in 1939, according to the Bureau of the Census, U. S. Dept. of Commerce. Dollar volume, reported by the trade, amounted to \$2641 million in 1948 compared with \$611 million and \$432 million for 1939 and 1929, respectively. Of the 1948 total, \$2326 million was accounted for by distributors primarily handling automotive parts and accessories. Garage equipment and tools wholesalers reported sales of \$76 million, and tires and tubes wholesalers, \$239 million.

Thompson Products Merger With Perfect Circle Off

Because of objection of the Dept. of Justice, plans for a merger between Perfect Circle Corp. and Thompson Products, Inc., have been cancelled. Both companies make piston rings. In a joint statement, the two companies said that they had been advised that the merger would violate anti-trust laws and that the Justice Dept. would take legal action if the merger were carried out.

Official 1950 Factory Sales Was 8,002,782 Vehicles

Final official figures on factory sales of motor vehicles for 1950 shows a total of 8,002,782 units. They include 6,665,628 passenger cars, 1,332,247 trucks, and 4907 motor coaches. Of the 1950 total, 152,842 passenger cars, 149,851 trucks, and 889 motor coaches were exported, compared with 156,141 cars, 131,017 trucks and 617 motor coaches in 1949.



INTRODUCING A WRECKER

This new Holmes Wrecker model 850, mounted on a Ford chassis, is being introduced by the Ernest Holmes Co. With a rated boom capacity of 15 tons and a pulling capacity of 35 tons, this unit can pick-up and bring in large trucks, buses, trailers and tractors.

UAW-CIO Says Yearly Wage Is Next Objective

The next big objective of the UAW-CIO will be the guaranteed annual wage. Walter P. Reuther, UAW president, has announced that the annual wage drive will be next on the union's schedule. He indicated that the union will collect the supporting data for the drive during the course of the present long-term contracts, indicating that the annual wage will be discussed when present contracts are up for renewal.

vanderZee Elected to AMA Committee

A. vanderZee, vice-president of Chrysler Corp., has been elected chairman of the sales committee of The Automobile Manufacturers Association. He succeeds William E. Hufstader, GM vice-president in charge of distribution.

Hudson Signs Five-Year Wage Agreement

Hudson has joined most of the automobile industry in writing a new five-year contract containing the standard cost-of-living escalator clause and an annual improvement factor of four cents an hour. Willys-Overland is the only other automobile company not now under such a contract and negotiations are in process there. Hudson's escalator clause is identical with those of

other companies and the annual improvement factor is the same except for the effective date, which is Aug. 1 of each year. Also included in the new contract is a general wage increase of one cent an hour, provisions for improved vacation pay, and adjustment of wage inequities in certain classifications.

Westinghouse Develops New "Co-Pilot"

What is described as the first automatic pilot with unlimited maneuverability, a midget electrical "co-pilot" device to be installed in the F-94C fighter plane being built for the U. S. Air Force by the Lockheed Aircraft Corp., has been announced by the Westinghouse Electric Corp. The "co-pilot" is said to be able to guide the new all-weather jet fighter plane through loops, rolls and other combat maneuvers with split-second accuracy. Scientists and engineers of the Westinghouse Electric Corp. together with flight engineers of the Air Material Command's Armament Laboratory, Control Equipment Branch, developed the device.

Hold Vehicle Maintenance Show in New York City

Described as the first large-scale exposition of preventive maintenance held in this country, the Transport Vehicle Show, held in New York City from

News of the AUTOMOTIVE

Feb. 1 to 4, featured the newest techniques and devices for lengthening the lives of trucks, buses, and other vehicles. The show was sponsored by the Automotive Transport Trades Council. Anticipated shortages of equipment and replacement parts in the motor transportation field offer problems which were discussed and demonstrated at clinics, forums and the 40 display booths at the show.

Lead Time Helps Hold Car Output High

One factor that has been holding automobile production at reasonably high levels and that has not been talked

car features an aluminum body and is powered by a Cadillac engine. Production is expected to be stepped up to one car a day eventually.

Chrysler Indiana Plant Closed for Conversion

Chrysler is the second major automobile company to start conversion of a branch assembly plant for war production. The Evansville, Ind., assembly plant is being closed, and Plymouth operations carried on there will be moved to Detroit about the first of March. The company has not announced the type of defense work that will be done at Evansville. During the last war small caliber

its use in bumpers, bumper guards and a few other items where satisfactory substitution cannot be used. It also prohibits use of stainless steel for automotive trim if it contains six per cent or more nickel. However, most of the stainless steel now being used for trim is of the straight chrome type with no nickel content and consequently is not affected. It is possible to put a thin flash of chrome over stainless steel, an expedient which probably will be used more extensively, especially for grilles. Where plating is permitted the thickness is held to .001 in. which would mean a reduction of about .0005 in. on certain items. The restrictions apply beginning March 1. After that date



FRENCH FREIGHTER

The new French-built twin-engine airplane, the Nord 2501, designed mainly for freight, can be transformed to carry 43 passengers. With a top speed of about 260 mph, and a range of 3000

miles, the new plane can carry a maximum of six tons of freight. As shown above, doors in the rear of the fuselage provide an opening large enough to accommodate an automobile.

about much is the "lead" time on components. Cars built in January and in some cases in February are actually being built with components manufactured back in November and December. There is some opinion in the industry that it will not be until March or April that the full impact of the copper and aluminum limitations orders will be felt. First quarter production of cars is going to be fairly good even though it falls 20 per cent or so behind the peak rate of last year.

Muntz Builds First Sports Car

The Muntz Motor Co. has produced its first high-priced sports car at its newly-acquired plant in Chicago. The

ammunition and fire bombs were produced there. GM is the other major company to convert an assembly plant for war work. The B-O-P plant at Kansas City will be used for fighter plane production.

Bright Trim on Cars to Stay Few Months

Although it seems likely that bright work on automobiles will eventually become a casualty of war, it now looks as though that may not happen until about mid-year unless banned by government order. The recent nickel limitation order is not as bad as was thought at first. The order prohibits the use of nickel for plating in a specified list of automotive trim parts, but does permit

two months are allowed to complete material in process and it will be some time after that before finished parts actually reach the assembly line. All manufacturers, however, are making preparations for substituting other materials for those banned in the order, or for painting trim a contrasting color.

Chrysler Plans Addition to West Coast Plant

The Chrysler Corp. will build a new 730,000 sq ft plant adjacent to its present Dodge plant in San Leandro, Calif. The new unit has been planned primarily for automobile manufacturing work, but it may be used for defense production if general conditions demand it.

INDUSTRIES

Ford to Add New Ore Carrier

Ford has awarded a contract for construction of a new ore ship. It will be larger than either of the two ore carriers the company now operates and which have been in service since 1924. The new ship will be 647 ft long with a beam of 70 ft, will have a capacity of 19,000 gross tons and a speed of 16 mph.

Curtiss-Wright Form Electronics Unit

To permit consolidation and expansion of activities in the electronics field, a new Curtiss-Wright Corp. division has been announced by Roy T. Hurley, president. The need for the newly-established Electronics Div. arises from the increased demand for flight simulators, trainers, and other products now being developed. The headquarters of the new division will be in Caldwell, N. J., and it will be headed by Joseph V. Miccio, general manager, who was formerly division controller of the Airplane Div.

Bethlehem Steel Plans Big Expansion

The Bethlehem Steel Corp. has announced a \$300 million expansion program. When completed, it will increase Bethlehem's annual ingot capacity by 2.6 million net tons and bring annual capacity to 17.6 million tons by the end of 1952.

Taxes Cut Earnings of McCord Corp.

McCord Corp. has reported net earnings of \$512,764 for the fiscal quarter ended Nov. 30. During the same period a year ago profit was \$571,931. The company reports that the lower earnings during the last fiscal quarter were due primarily to the increases in taxes.

Automotive Electric Group Hold Chicago Conference

The annual membership meeting and manufacturers-central distributors conference to be held in Chicago, from Feb. 16 to 23, will open a number of meetings to be held by the Automotive Electric Association in 1951. The AEA will again sponsor a series of two-day conference type of meetings, and the schedule is as follows: March 21-22, Dallas, Tex.; March 26-27, San Francisco, Calif.; April 9-10, Atlanta, Ga.; April 12-13, New York City; and May

17-18, Chicago, Ill. The annual fall meeting will be held Aug. 28-Sept. 1, at White Sulphur Springs, W. Va.

Italy's Car Output Hit New High in 1950

Italian automobile production reached a new high level in 1950 with 127,847 units, compared with 86,054 during the preceding year. The total was composed of 101,310 passenger cars, 15,159 light trucks, 8398 trucks and 2980 buses and coaches. Exports totaled 21,905 passenger cars and trucks, compared with 17,536 a year earlier, according to the Italian National Automobile Manufacturers' Association.

Packard Workers Approve Union Shop in Vote

Packard employees have approved a union shop in an election conducted by NLRB. Packard had previously agreed to the union shop in its most recent contract, provided the workers approved the action as requested under the labor law.

Plymouth Reported Developing V-8

It is reported that Plymouth will have a V-8 engine the next time a major power plant change is made. It is known

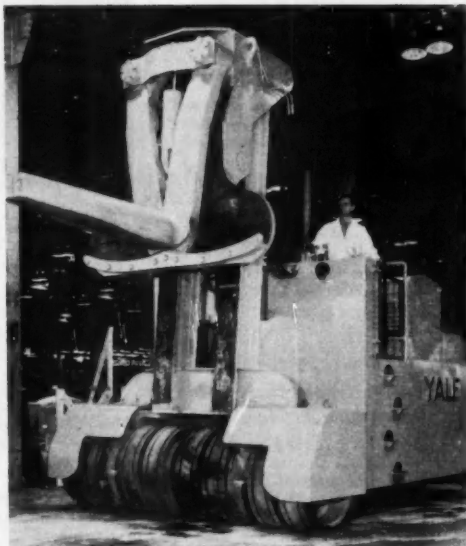
that both Dodge and De Soto are developing overhead valve V-8 engines very similar in design to the new Chrysler V-8, and it is understood that the Plymouth engine will also follow the basic design of the Chrysler 8. Because of the uncertain situation ahead, however, there is no indication as to when the new engines in the Chrysler family will get into production.

New Steel Mill Planned for Detroit Area

Detroit is to have a new steel mill. A new company has been formed called Gibraltar Steel Corp. and plans are underway for a \$100 million plant to be built on a 900-acre site in Trenton, a suburb of Detroit. Involved in formation of the company are Carlton H. Higbie, Detroit financier and manufacturer; Cyrus Eaton, of Otis & Co., Cleveland, and Max Zivian, president of Detroit Steel Corp. who will be president of the new company. It is expected that if a certificate of necessity is granted by NPA that the mill will be in operation in about 18 months. First year production is expected to be 800,000 tons of ingot steel, with capacity being increased eventually to 1.6 million tons a year. Original capitalization will consist of 1.5 million shares of \$10 par value stock with \$10 million offered in original financing and 500,000 shares retained in the treasury. The balance

LARGE LIFTER

This 80,000 lb capacity industrial lift truck, reportedly the largest of its kind, has been announced by the Yale & Towne Mfg. Co.'s Philadelphia Div. Built for the steel industry, this truck weighs 84,000 lb. and is powered by a 165-hp Cummins Diesel engine driving a 90-kw General Electric locomotive type generator. Two large rams that open and close like a scissors on the front of the truck enable the unit to carry one large coil of steel or two smaller ones. It is the first of a new series of ram and fork trucks now available in capacities from 20,000 lb to 100,000 lb. The unit's overall height is 178 in.; overall width, 124 in.; and lifting height, 91 in.



News of the AUTOMOTIVE



SKY TANKER

A Boeing KC-97A Stratofreighter is shown here in its new role as an aerial tanker for the U. S. Air Force. Here it is refueling a Boeing B-50D Superfortress. It uses a modified installation of the Boeing Flying Boom type of standard refueling equipment.

of the capitalization will be sought as a loan from RFC.

Aeroproducts Division to Double Output

GM's Aeroproducts Div. has announced a 100 per cent expansion of its facilities at Dayton, O. When the program is completed, the plant will contain more than 500,000 sq ft of manufacturing, laboratories, testing and office space. The new building will be incorporated with the present structure located on the Dayton Municipal Airport.

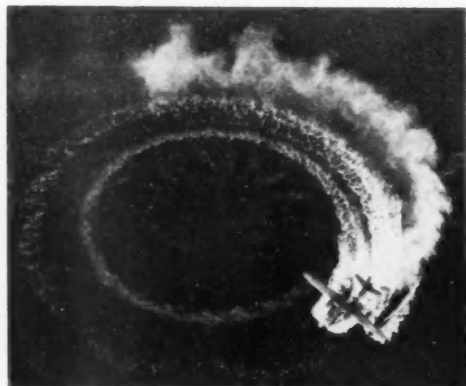
New Army Truck Tire Has High Flotation

The rubber industry in cooperation with the Army Ordnance Corps has developed a new high flotation tire which soon will be standard equipment on Army tactical trucks. Designed for low pressure operation in mud and sand, the tire is so constructed that the air pressure is increased for normal operations on solid footing, with performance equivalent to conventional military tires. The special tread design has excellent tractive characteristics for general trucking use but digs less into mud and sand.

Avro Builds New Factory for Jet Engine Production

A new factory for the production of the Avro Canada Orenda turbo-jet engine now being built at Malton, Ont., Canada, will be in operation by the end of this year. T. O. M. Sopwith, chairman of the Hawker-Siddeley group of

aircraft manufacturers, told a shareholders' meeting in London, England. Avro Canada is a member of the group.



Ford to Build Aircraft Pumps at Cincinnati

Ford is planning an addition to its new automatic transmission division plant in Cincinnati to house manufacture of aircraft engine lubrication pumps for Pratt & Whitney B-36 bomber engines. The pumps will be shipped to the aircraft engine division plant in Chicago for assembly in engines to be built there by Ford. The addition will add 220,000 sq ft of floor space, or nearly twice as much as the present plant contains. Production of aircraft pumps is scheduled to start some time next fall.

Aircraft Engine Jobs Need Subcontractors

The Detroit Air Force Procurement field office has asked that all manufacturers interested in subcontracts for production of the Wright R-3350 Cyclone engine and the British Sapphire J-65W jet engine get in touch with the office at Warren Avenue, west, and Lonyo Road in Detroit.

Chrysler 1951 Tooling Cost \$50 Million

Chrysler spent \$50 million on tooling and other costs in preparation for its 1951 models, according to K. T. Keller, board chairman. He said that the \$50 million does not include development costs of the new V-8 overhead valve engine being offered initially in the Chrysler Crown Imperial and New Yorker models. He also said that the company's facilities have been increased one-third since the end of World War II and that an additional 33 per cent more

CHASING ITS TAIL

Shown demonstrating a short radius turn through the use of hydroflaps is this Martin XP5M-1 prototype of the Martin flying boats being built by the Glenn L. Martin Co. for the Navy. Hydroflaps are underwater rudders and brake developed by Martin to make quick turns and faster maneuvering possible in restricted waters, and are located on each side of the hull near the stern.

floor space now is under contract to be built, most of which will go into war work when completed. He indicated that the company has several war assignments in addition to those already announced.

Int'l Starts Assembling Trucks in Australia

The manufacture of International L-line trucks started recently at Melbourne, Australia, as government officials joined officers of the International Harvester Co. of Australia, Pty., Ltd., in an assembly-line ceremony.

INDUSTRIES

Tank Test Track Built at Cleveland Plant

The tank test track at the Cleveland tank plant operated by Cadillac has been completed. The track is 5686 ft long and 28 ft wide and was built at a cost of \$210,000. It is laid out in a figure eight pattern and will be used to subject every new tank to a 50-mile run. After the tanks are approved by Cadillac, Ordnance inspectors will give them an additional 10-mile test. A new \$45,000 security fence around both the track and the buildings of the tank plant has been completed.

All Combat Vehicles to be Submersible

All combat and tactical ground vehicles now being ordered for the Armed Services carry specifications for underwater operation. Tanks, tank destroyers, trucks and jeeps ordered for combat zone operations are ordered equipped with kits which can be attached quickly to make the vehicle operative while submerged. The equipment consists of a pipe for venting exhaust and a snorkel tube to supply air to the carburetor. Flanged fittings for attaching the equipment are standard equipment on the vehicles.

Bell Aircraft Takes Over Plant in Texas

Bell Aircraft Corp. has leased a government-owned World War II aircraft plant in Ft. Worth, Tex., for the manufacture and assembly of bomber parts. Bell will use the Texas plant for manufacture and assembly of bomber-engine nacelles, including the installation of the jet engines. The plant will assemble the complete engine package, ready to hang on the wings of big bombers.

K-F to Make Components for Lockheed

Lockheed Aircraft Corp. has signed a contract with Kaiser-Frazer Corp. for the fabrication and assembly of components of the Lockheed P2V Navy anti-submarine patrol plane. Fuselage waist sections and center section flaps will be manufactured at the Kaiser-Frazer aircraft division plant in Oakland, Calif.

International Sets Up Detroit War Office

International Harvester Co. has established a military products office in Detroit to expedite its war production program in that area. Ralph G. Greer,

previously motor truck regional sales manager, will be in charge of the office and will act as liaison between the company and the Ordnance Corps in Detroit.

Northrop to Build More Scorpions

Northrop Aircraft, Inc., will build an additional number of Scorpion F-89 all-weather interceptors for the U. S. Air Force. A letter of intent has been received for the new contract, but the number of planes involved was not disclosed. The production order will bring Northrop's current backlog to approximately \$180 million, according to Oliver P. Echols, general manager and chairman of the board.

K-F Repays \$1 Million on RFC Loan

RFC has reported that Kaiser-Frazer has already repaid all funds drawn against the \$25 million loan obtained last December. The agency reports that K-F used only about \$6 million of the loan and that the entire sum has been repaid in addition to \$1 million extra which was applied on earlier RFC loans totaling \$44.5 million.

Wright Buys Plant in New Jersey

The Wright Aeronautical Corp. has bought the 540,000-sq ft facilities of the New Jersey Worsteds Mills, Garfield, N. J. The engine manufacturing sub-

sidary of the Curtiss-Wright Corp. will take immediate possession of about one half of the space in Garfield and the balance of the space within a year. Located a quarter of a mile away from Wright's Wood-Ridge plant, the new facilities occupy a tract of about 26 acres and afford 400,000 sq ft of ground-floor area in addition to basement space and a three-story warehouse.

Tire Prices Increased to Vehicle Builders

An increase of from 12½ to 17½ per cent on original equipment tires has tightened the squeeze on automobile and truck manufacturers. It is reported that the action was approved by ESA following discussions with the tire companies who apparently proved that their costs justified the increases. The price of natural rubber has tripled during the last year and the government itself has raised price of synthetic rubber by about 32 per cent.

Navy Takes Lustron Plant for Planes

The Lustron plant at Columbus, O., has been turned over to the Navy by the government for use in aircraft manufacturing. North American Aviation Co. already occupies half the plant, and it is expected to take over operation of the entire unit for the Navy. During the war the government-owned plant was used by Curtiss-Wright.

(Turn to page 118, please)



FARM HELPER

The Gleaner Harvester Corp.'s new 14-ft self-propelled combine is powered by a Ford industrial engine. The unit measures 265 in. in overall length; 124 in. in height in operation; 183 in. in overall cutting width, and it weighs about 7300 lb.

How to get a car buyer to cross the street

YOU can probably name a number of reasons why a car buyer switches from one make to another. One time it's style. Another time it's lower cost. In times of shortage, availability alone can do it.

But there's one vital reason that's *always* in the picture—value.

The first step in getting today's value-minded car buyers to cross the street to your dealers' showrooms is the value engineered into your car. And the point where value counts most is, of course, the moving parts—the "vital zone".

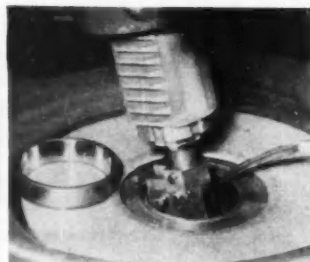
When you buy parts for the "vital zone" of your car—differential bearings, for instance—make sure they'll give you top value. Here's a guide that might help:

$$\text{Value} = \frac{\text{quality} + \text{service} + \text{public acceptance}}{\text{price}}$$

Obviously, a *big* advantage *above* the line will give you more value than a *small* one *below* the line. By this formula or any other, your best value in tapered roller bearings is Timken®. No other bearing can match the uniform high quality, extensive service help and overwhelming public acceptance you get with Timken bearings. And in terms of value features, prices of Timken bearings are the lowest today. The Timken Roller Bearing Company, Canton 6, Ohio.



How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":



FINISHED TO CLOSER TOLERANCES. Finishing to incredible limits of accuracy and smoothness accounts for much of the smooth rolling performance of Timken bearings. This honing operation is typical of the amazingly precise manufacturing methods at the Timken Company.



PICKED FOR PINIONS! All but two makes of cars use Timken bearings in the pinion, toughest bearing application on a car. It's proof of the preference for Timken bearings where value counts most—in pinions, wheels, differentials,—the "vital zone" of the car.

ONLY TIMKEN BEARINGS GIVE YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. 50 years experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's **TIMKEN** for **VALUE**
TAPERED ROLLER BEARINGS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers



Borg-Warner Corp.—Harold G. Ingersoll was elected a vice president. In addition to his new office, Mr. Ingersoll will retain the presidency of the corporation's Ingersoll Steel Div. at New Castle, Ind.

Oliver Corp.—W. E. Miles, (shown at right) manager of the industrial division, has been elected vice president in charge of crawler tractor and industrial sales. L. Pierce Richie, director of purchases, has been elected vice president in charge of purchases.



Kaiser-Frazer Corp.—The appointment of Steve Girard as assistant general manager and Dean Hammond as vice president in charge of engineering has been announced. George C. Harbert, chief body engineer, was named chief engineer in charge of automotive, and Ralph H. Isbrandt, chief chassis engineer, was appointed chief engineer in charge of aircraft.

Carboloy Co., Inc.—Philip D. Moore, formerly administrative assistant to the vice president in charge of employee, community and union relations at General Electric Co., New York, has been appointed manager of employee and community relations.

Fairfield Mfg. Co.—E. M. Heinmiller has been elected president to succeed A. J. McAllister, who has retired.

Borg-Warner Corp.—L. G. Porter has been elected treasurer. He had been vice president and secretary of the Calumet Steel and the Franklin Steel divisions of B-W. Thur Schmidt has been appointed assistant to the president, Ingersoll Products Div. Mr. Schmidt was previously general manager of the Highway Steel Products Co.

R. D. Fageol Co.—H. W. Fagert was elected president, general manager and board member.

Fairchild Engine and Airplane Corp., Fairchild Engine Div.—E. M. Lester has been appointed to the new post of assistant general manager.

General Motors Corp.—Robert M. Critchfield, at present factory manager of the Delco-Remy Div., was named as-

sistant general manager of the Allison Div.

Kennametal Inc.—Alex G. McKenna was made executive vice president; John C. Redmond, vice president; and Richard J. Flickinger, assistant secretary.

The Ohio Rubber Co.—Election of Franklin G. Smith as chairman and General Hermon F. Safford as president has been announced.

The Budd Co.—D. A. Coyle has been named plant manager of the company's Charlevoix plant in Detroit, to succeed Albert Walton, recently promoted to general manager of manufacturing. Mr. Coyle, formerly works manager of Charlevoix, will be succeeded by W. H. Montee.

Stewart-Warner Corp.—Expansion of the board from seven to eight members and election of Henry T. Heald, president of Illinois Institute of Technology, to fill the newly created seat, has been announced.



R. M. Lake



James B. Fenner



Lyman A. Wine



H. E. Hasemeyer

Electric Auto-Life Co.

—The election of five vice presidents (see above) by the board of directors has been announced: James B. Fenner, formerly treasurer, was named vice president and comptroller; H. E. Hasemeyer, formerly assistant to vice president in charge of manufacturing; R. M. Lake, who has been a director of the corporation; C. L. Lancaster, manager of the Sharonville, O., plant; and Lyman A. Wine, formerly assistant to the president.



C. L. Lancaster

Necrology

Walter Geist, 56, president of the Allis-Chalmers Mfg. Co., died on Jan. 29 in Milwaukee, Wis.

Ferdinand Porsche, 75, designer of engines and automobiles and inventor of the German Volkswagen, died on Jan. 30 in Stuttgart, Germany.

Ellis Wing Taylor, 63, structural engineer and architect, who designed some of California's largest airplane plants, died recently in Arcadia, Calif.

Richard H. Collins, 84, former vice president and a member of the board, General Motors Corp., died in Los Angeles on Feb. 4.

Dr. August Horch, 83, automobile pioneer, died in Muenchberg, Bavaria, Germany, on Feb. 3.

Lawrence "Larry" Therkelsen, 68, veteran timer of record-breaking flights, and West Coast representative, Federation Aeronautique Internationale, died recently in Los Angeles.

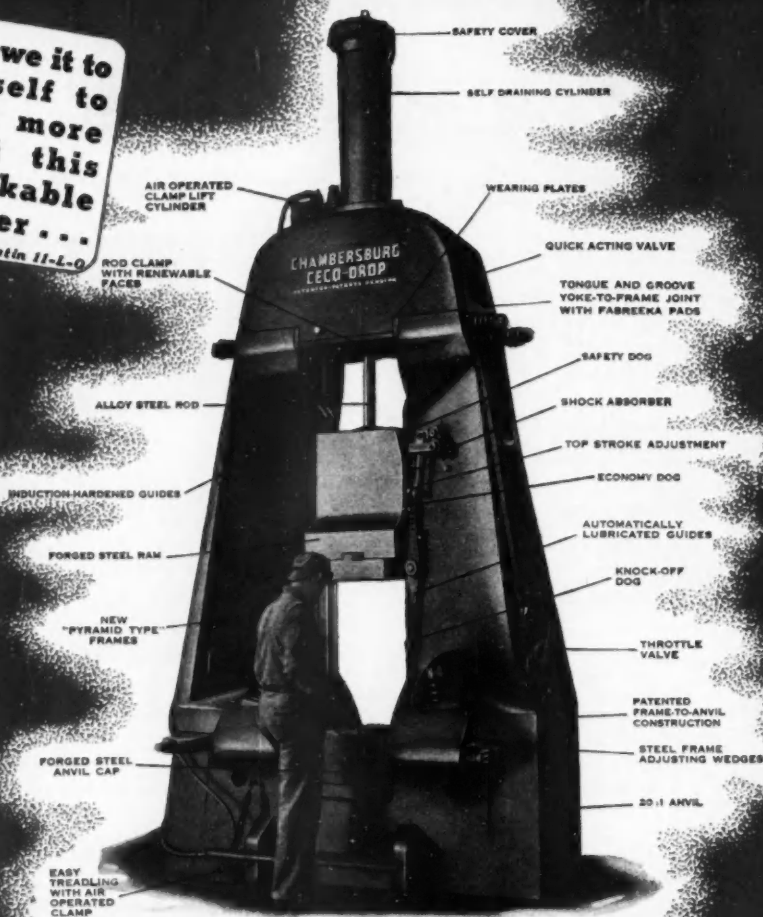
Standard-Thomson Corp.—F. H. Schroeder, vice-president and director, Lee Higginson Corp., has been elected a director. Walter E. Carlson has been appointed works manager of the five manufacturing plants in Dayton, O.

Douglas Aircraft Co.—Three California plant managers have been promoted to newly-created posts of operating division general managers: **Eric Springer** was named general manager of the El Segundo, Calif., division; **Fred Herman**, for the Long Beach, Calif., division; and **Leo Carter** for the Santa Monica, Calif., division. **Harry Woodhead**, former president of Consolidated-Vultee Aircraft, has been named general manager of the Douglas Tulsa division.

(Turn to page 112, please)

**You owe it to
yourself to
learn more
about this
remarkable
hammer...**

Write for Bulletin 11-L-0

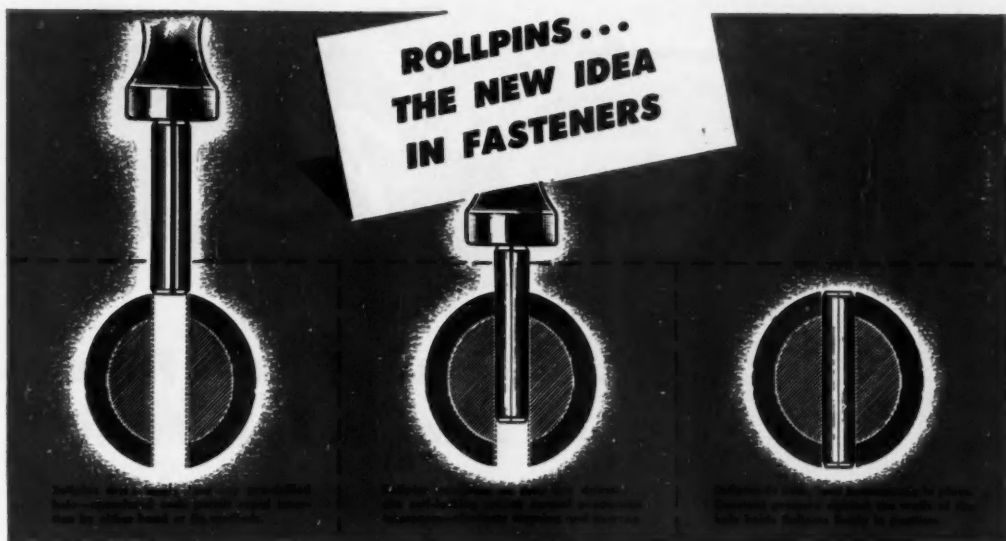


CECO-DROP

• The Boardless Gravity Drop Hammer •

**No Boards • No Front Rod • No Back Rod
Costs less to operate... Forges more minutes
per hour... Is safer and easier to operate...
This hammer is setting new records in cutting
forging costs and in increasing production.**

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.



How much can Rollpins save on your production line?

Here's important information on Rollpins—the amazing new fasteners that eliminate slow, expensive reaming, peening, and machining operations. Just imagine the cost-cutting possibilities provided by a single fastener with such wide design and application flexibility that it can replace tapered pins, grooved pins, or straight pins. Investigate the savings Rollpins offer *your* product.

In the short period since their introduction, manufacturers are already using Rollpins as steel fastening pins holding pulleys and gears to shafts; as pivot or hinge pins, clevis pins, cotter keys, shafts, and locating dowels . . . to provide lower-cost, simplified, vibration-proof assemblies.

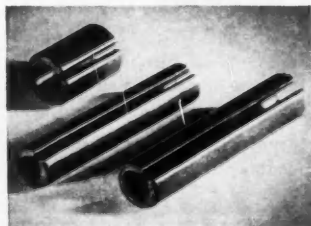
Rollpins require no special installation skills . . . readily

replace your present fastener . . . exceed the sheer strength of a cold-rolled pin of equal diameter. Rollpins stay tightly in place until deliberately removed with a pin punch—can be used over and over again.

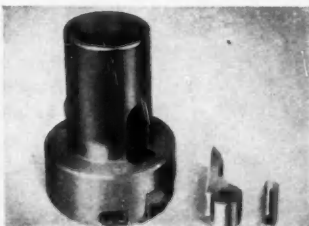
For complete information on Rollpins and their almost unlimited money-saving applications write to Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.



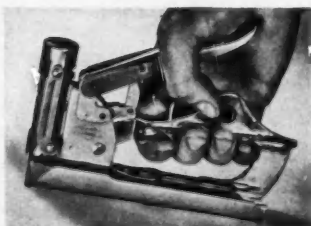
**ELASTIC STOP NUT CORPORATION
OF AMERICA**



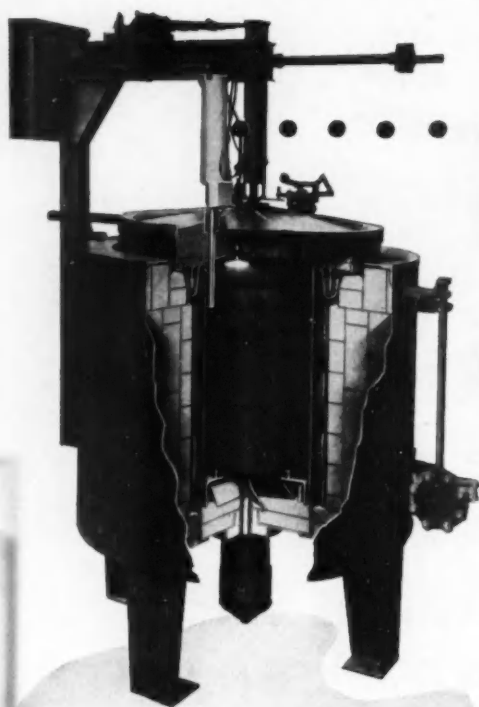
Rollpins are made from either Carbon Steel or Stainless Steel and are readily available from stock in diameters from 1/16 inch to 1/2 inch and in a broad range of standard lengths.



Rollpins are used to replace a hardened, ground tapered pin in this feed tube finger clutch assembly—stand up to flexing and shock more than 2,400 times an hour.



Four Rollpins are used in this Hansen tucker as pivots. Self-retaining, they eliminate headed rivets and bolts . . . simplify maintenance operations . . . provide a flush fit.



Microcarb Control is part of the Series H Homocarb furnace. This new furnace with its many important features . . . solid bottom retort, convection cooler, new fan housing and work support, aerodynamically designed vanes and discharge jets . . . is a superior heat treating tool.



Now!

Homocarb Furnaces Feature Microcarb AUTOMATIC Atmosphere Control

NOW heat treaters can do what formerly has been impossible . . . that is, continuously measure and control the carbon potential of a furnace atmosphere directly in terms of per cent carbon.

A new development by Leeds & Northrup Company, called "Microcarb" Control, makes this possible. It regulates atmospheric carbon content during heat treating as accurately as temperature is regulated. Atmosphere can be adjusted to increase or decrease the carbon potential automatically, as required for the job . . . whether it's surface carburizing, homogeneous carburizing, carbon restoration, hardening or annealing.

Principal feature of the Microcarb carbon control system is its Carbohm detecting element. This device projects into the furnace work chamber like a thermocouple; electrically senses the carbon potential of the furnace atmosphere. Connected to the element is a Microcarb Controller, which automatically adjusts the flow of Homocarb fluid to hold carbon potential of furnace gas at any selected value between 0.15 and 1.15 per cent carbon. For the heat treater's guidance, a Micromax recorder draws a continuous record of per cent of carbon as detected by the Carbohm element.

Microcarb Control is supplied for use with Leeds & Northrup Homocarb furnaces. It can be ordered as an integral part of new Homocarb equipments, or can be added to certain furnaces now in service.

For further information write to our nearest office or to Leeds & Northrup Company, 4966 Stenton Avenue, Philadelphia 44, Pennsylvania.



MEASURING INSTRUMENTS • TELEMEETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jrl. Ad T-620(51)

FOOTBURT

Production-wise engineers

in leading automotive plants are specifying Footburt station type equipment on cylinder blocks, cylinder heads, trans-

STATION

mission cases, and other component parts as the most advanced method in quantity manufacturing. Similar operations that ordinarily require several

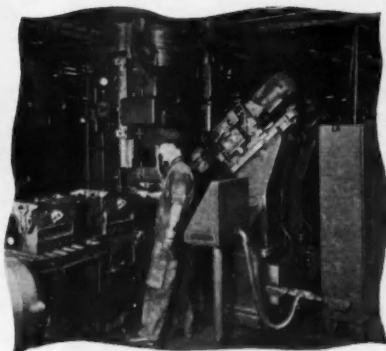
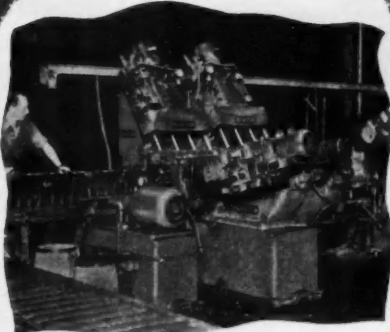
TYPE

separate machines are grouped in one station machine thus greatly reducing handling and providing better production control. Combining

MACHINES

boring, the majority of drilling and the majority of tapping are outstanding examples of this latest production trend.

THE FOOTE-BURT COMPANY
CLEVELAND 8, OHIO
Detroit Office:
General Motors Building



● A TIME TESTED LINE OF MACHINE TOOLS

FOOTBURT

machine tools

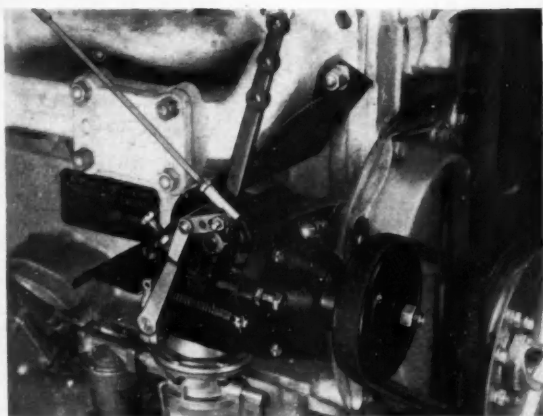
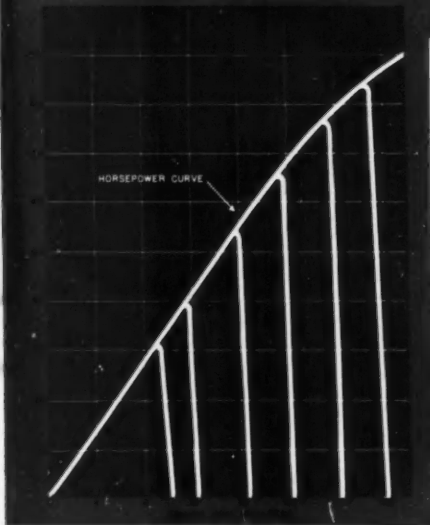
ENGINEERED FOR PRODUCTION

HOOF MECHANICAL GOVERNORS

- Provide close regulation over wide operating range, without spring change.
- Employ ball or roller bearings at all load points.
- Do not require daily oilings; use oil seals throughout and have large oil capacity.



Performance Graph of Installation Shown below



Hoof Mechanical Governor installed on well known industrial engine

HOOF PRODUCTS COMPANY

6543 South Laramie Avenue, Chicago 38, Illinois

CORRESPONDENCE
IS
INVITED

GOVERNORS

• VELOCITY AND CENTRIFUGAL TYPES

• HYDRAULIC VALVES FOR AIRCRAFT

How Thin Can a Head Gasket Be for High Compression Sealing?

VIC-2-FOLD

**The Thinnest Practical Metal-Asbestos
Construction... Compressible
to .040 Average**

**Fully effective
on Valve-in-head
or L-head engines**

With VIC-2-FOLD gaskets, you can meet the exacting requirements of modern high-compression engine head sealing. VIC-2-FOLD is the thinnest practical construction for a compressible metal-encased asbestos gasket. On the engine, it compresses to .040" average.

VIC-2-FOLD design combines the high breakdown resistance of steel and the corrosion-resistance of copper. The overlap forming of the VIC-2-FOLD gasket case, as detailed at right, takes maximum advantage of each of these metals.

Superior General Purpose Gasket at Moderate Cost

Not only does VIC-2-FOLD excel standard gasket construction for flexibility, but has adequate compressibility for positive sealing in all applications. Thorough dynamometer testing shows that VIC-2-FOLD has all desirable features of a general purpose gasket, and is equally suited for Valve-in-head or L-head engines, in gasoline or diesel service.

Complete Technical Data Supplied on Request

Ask your Victor Field Engineer to give you the full details on VIC-2-FOLD gaskets. No obligation. Or, if you prefer, send your inquiry direct to the Engineering Dept., Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90, Ill.

Section across combustion opening showing the VIC-2-FOLD construction

Note how bottom layer of steel is formed up in combustion chamber openings, and overlaps asbestos filler and top layer of copper, thereby utilizing the high strength of steel against breakdowns and blowouts.

Similarly in coolant openings, the top layer of copper is formed down and overlaps the asbestos filler and bottom steel layer. This utilizes the high corrosion resistance of copper in contact with coolants and anti-freeze solutions.

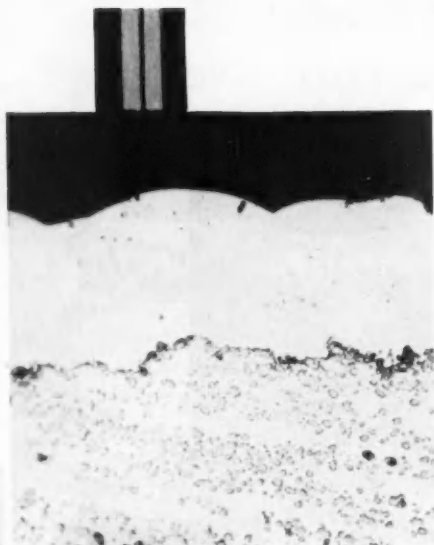
Asbestos filler is of the finest quality, precision milled and composed in Victor's own plant.

**SEALING
PRODUCTS
Exclusively**



VICTOR

GASKETS - OIL SEALS



Photomicrograph of hard chromium deposit on a base of light alloy at a magnification of 500X.

CONSIDERABLE research and development work on "light-metal" (aluminum) engine cylinders without cast-iron liners has been done by the Mahle firm of Stuttgart, Germany. This concern, which manufactures aluminum pistons, die castings, compressors, etc., has been interested in the subject for many years, but all of the earlier attempts to obtain satisfactory operating conditions and a tolerable life with such cylinders proved unsuccessful. An outline of the advantages which might be expected from aluminum cylinders if they could be made to show a satisfactory life without the use of liners, and of experimental results more recently obtained was given in an article by Dipl.Ing. Ernst Mahle in a recent issue of *Motortechnische Zeitschrift*, of which the following is an abstract.

Some work was done by the Mahle firm in collaboration with the English engineer Cross, who had invented an engine in which there is no direct contact between piston and cylinder, the former being guided in the latter solely by the piston rings, which bottom in their grooves. Cylinder assemblies of this type were fitted into one motorcycle and four different

makes of passenger cars. Only in one case was the cylinder wear after 6200 miles smaller than it is normally with cast-iron cylinders, and much trouble was encountered from excessive extraneous noises, from blowby, and from "freezing" of piston rings. It was impossible to obtain satisfactory results even in passenger-car service, although there the engines are normally only lightly loaded.

New possibilities in this field unfolded with the introduction of the Van der Horst process of hard chromium plating, which is ordinarily applied to the bores of cast-iron cylinders and liners. Experiments in the application of the Van der Horst process to aluminum cylinders were begun in the motor-vehicle

Aluminum without

laboratory of Stuttgart Technical College in 1939, and these were closely followed by the Mahle concern. Tests of a Hirth air-cooled aircraft engine with chromium-plated aluminum cylinders showed a material increase in output, and this led to the conclusion that it would be worthwhile to continue the experiments. Only the plating process gave some trouble at first.

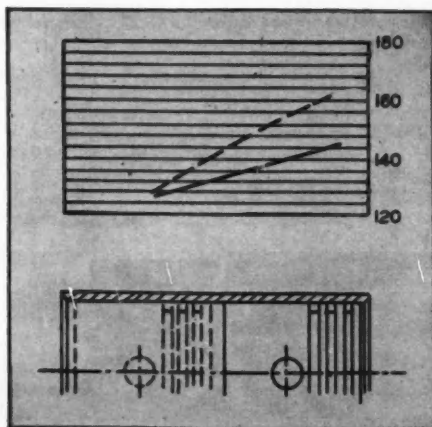
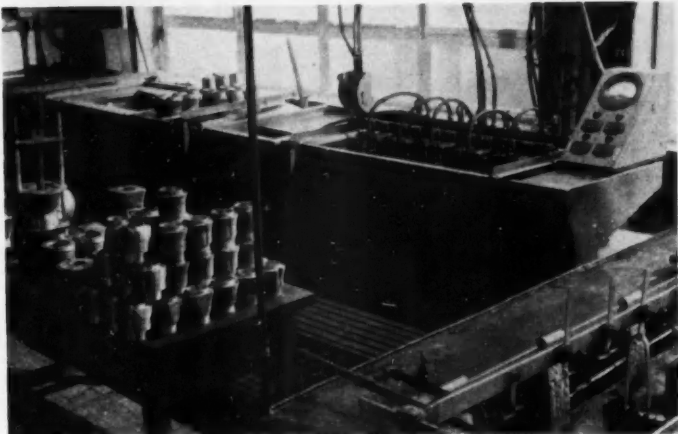


Fig. 1. Comparative temperatures. Dotted line represents a cast iron cylinder at normal compression; solid line represents an aluminum cylinder with higher compression.

Experimental chrome plating installation in the Mahle plant for plating cylinders and cylinder liners.



By
P. M.
Heldt

Cylinders Cast Iron Liners

After Mall in the United States, beginning in 1944, had converted a lot of small engines (used principally for operating portable saws) from cast-iron to chromium-plated aluminum cylinders, and after Hornet Industries in Canada, following in Mall's footsteps, had produced several thousand light-metal cylinders for the same purpose, the Mahle concern took up the problem again, as soon as post-war conditions in Germany permitted.

A considerable number of cars and motorcycles had their cast-iron cylinders replaced by chromium-plated aluminum cylinders in the experimental department of the Mahle Works, and at the time the original article was written a total of more than one million road kilometers had accumulated. Individual vehicles had been run 37,500 and 44,000 miles. Periodic measurements were made on the engines of these vehicles, which were still running satisfactorily at the time of writing. Chromium-plated non-corrodible liners were fitted into a total of 30 different designs of engine, including air-cooled two-stroke gasoline engines, air-cooled four-stroke gasoline and Diesel engines, and water-cooled four-stroke gasoline and Diesel engines.

(Turn to page 98, please)

Recent Developments in Germany
Demonstrate Feasibility of
Chrome Plating Cylinder Bores

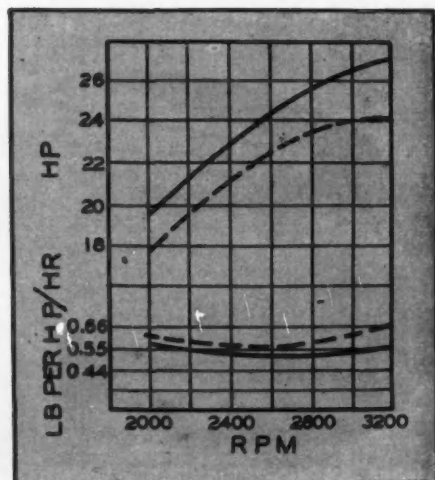


Fig. 2. Comparative outputs and fuel consumptions. Dotted lines refer to a cast iron cylinder at normal compression; solid lines refer to an aluminum cylinder with higher compression.



View of the seat and seat back conveyor traversing the trim line on the second floor.

ONE of the important expansion projects undertaken by the Nash Division, Nash-Kelvinator Corp.—the Rambler body plant in Kenosha—was completed recently and was in full swing at the time this article was prepared. This plant, a modern two-story structure comprising around 410,000 sq ft of floor space, entailed the addition of a second floor to the single story aircraft engine building erected during World War II. Although about half of the floor space on the first floor is devoted to final inspection and preparation of Nash cars, Rambler body operations

occupy approximately 330,000 sq ft of floor space including space gained by taking advantage of unused space between the old test cells.

Inspection of the Rambler body plant reveals that operations are confined to assembly and welding of the body structure on the first floor; painting, trim, and finishing operations on the second floor. The stampings going into these unit type bodies are purchased from the outside. Even casual inspection indicates this to be an outstanding facility for body building, utilizing the latest techniques and featuring unusual modernity of paint shop equipment.

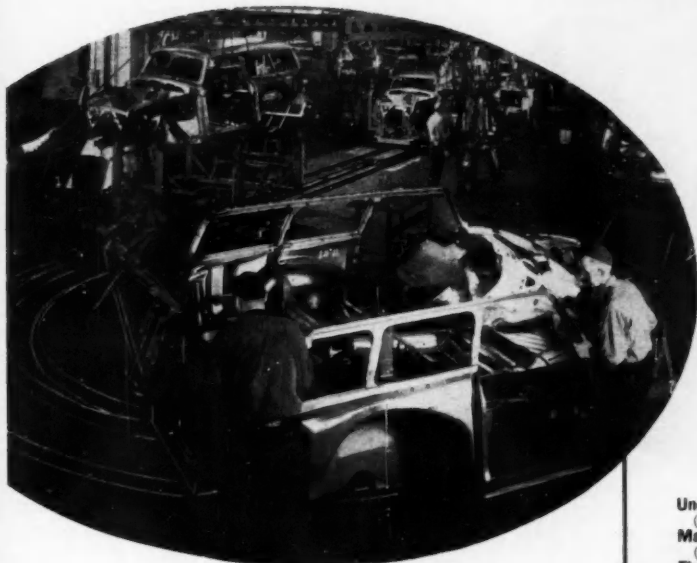
In keeping with mass production philosophy materials handling has been organized with the use of power driven conveyors of floor type and overhead type, boasting a total of almost four miles of conveyor systems — actually 19,979 ft. Details of the conveyor system are given in Table I.

Spray booth and drying oven equipment is of outstanding character. It requires an enormous amount of water circulation, air supply for fresh air and



Interior of the Binks color spray booth. It is of downdraft, water-wash type with a cascade of water directly under the grilles in the floor. Note particularly the excellent provisions for seeing with the fluorescent lighting.

Nash's New Plant for Making Rambler Bodies



Here is a perspective of the body framing merry-go-round on the first floor of the plant. In the foreground may be seen a body in the process of integration. Overhead is a portion of the Bull-Dog power duct feeding the welding tools. In the rear may be seen a finish-welded body being removed from the line by an overhead hoist.

exhaust, and a total natural gas heater capacity for spray booths and ovens of 84,900,000 Btu/hr maximum.

Actually there are two independent water circulating paint sludge systems in this plant, recirculated from storage basins in the basement. The major system distributes water at a high rate to the three spray booths which require 15,000 gpm for the overspray wash. This is carried in large conduit to and from the storage basin in the basement, circulation being handled by a large battery of Westinghouse motors driving high pressure pumps. The return water settles in the basin where paint and scum are skimmed off to permit reuse of the water supply.

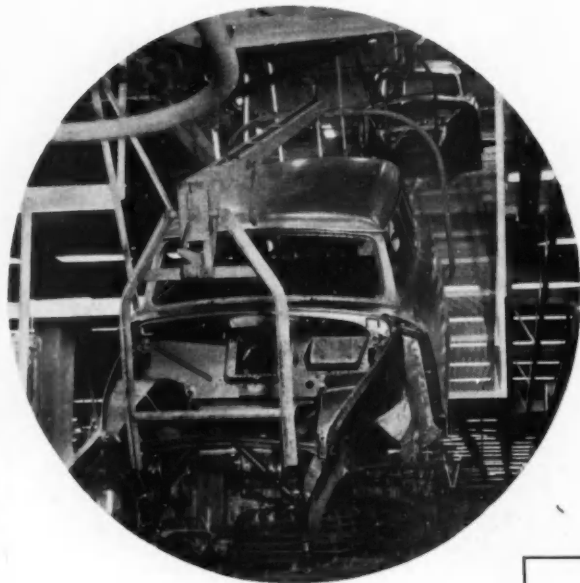
The second water circulating system takes care of water cooling of the Weltronic controllers, welding transformers, and welding guns on the assembly lines on the first floor. Since the return water is fairly warm, a certain percentage is by-passed to the wet-

With Almost Four Miles of Conveyor Systems, this Modern Two-Story Structure is Devoted to Assembly and Welding of the Unit Type Body Structure, and to Painting, Finishing, and Trim Operations. All Stampings are Purchased from Outside Sources.

Table I
Conveyor System
Nash Rambler Body Plant

Description	Conveyor Type	Length (ft)
Underbody Assembly (merry-go-round)	Floor	300
Main Framing (merry-go-round)	Floor	243
Finish Framing	Floor	1525
Uniside Delivery	O. H.	642
Truck Return	O. H.	480
Door and Deck Cover Delivery	O. H.	470
Body Bonderite	O. H.	1400
Body Prime and Color	Floor	1950
Body Two-Tone	Floor	600
Body Di-Noc	Floor	768
Painted Body Storage	Floor	348
Painted Body Storage	Floor	348
Painted Body Storage	Floor	348
Painted Body Storage	Floor	348
White Body Storage	Push	120
White Body Storage	Push	64
White Body Storage	Push	64
White Body Storage	Push	64
White Body Storage	Push	64
White Body Storage	Push	64
Trim Line No. 1	Floor	1850
Trim Line No. 2	Floor	983
Body Trim Repair	Floor	500
Body Trim Repair	Floor	500
Body Trim Repair	Floor	520
Truck Return	O. H.	1042
Finish Car and Body Delivery	O. H.	1550
Stock Delivery	O. H.	670
Seat Cushion Delivery	O. H.	182
White Body Storage	Push	64
White Body Storage	Push	64
Paint Repair	Floor	520
Paint Repair	Floor	520
White Body Repair	Push	104
Total		19,979 ft

NASH'S NEW PLANT FOR MAKING RAMBLER



As bodies come off the body-in-white line they are transferred from the body trucks to the overhead mount shown here and are transported to the paint shop on the heavy duty monorail conveyor.

sand deck on the second floor, thus providing operators with water at a comfortable temperature at all seasons. It is used also as make up water to the paint sludge systems. In the storage basin the difference in amount of fresh cold water is added to reduce the temperature of the water cooling supply.

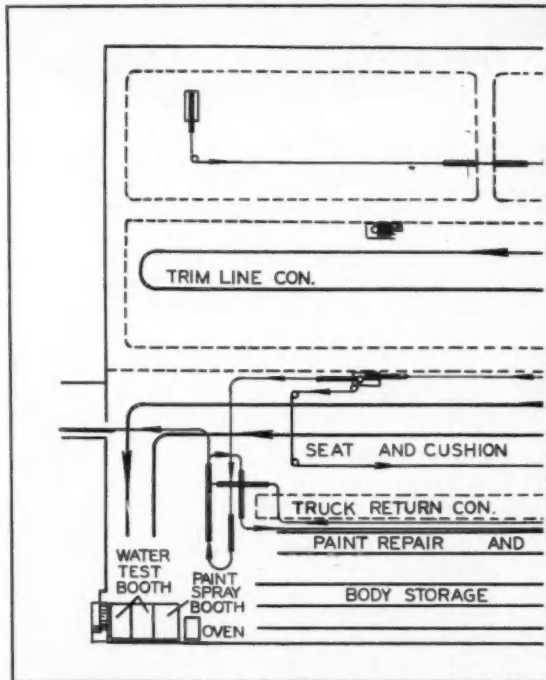
Coming to the details of the floor plan, it may be noted that all body assembly is done on the first floor. Here they have two merry-go-round conveyors—one for completing the welding of the underbody and cowl structure on a conveyor having a developed length of 300 ft, carrying 18 framing fixtures; the other with a developed length of 243 ft, carrying 14 framing fixtures for completing the major framing of Rambler bodies.

Upon completion of framing, bodies are transferred to the long, looping body-in-white line where the final welding is done, doors and deck covers installed, and the body is metal finished and prepared for paint. Welding operations are handled

primarily with resistance welders of portable type, fitted with specially designed welding guns to suit individual operations. Altogether the welding line has 100 gun welders, six spot welders, and 32 electric arc welders. Resistance welding equipment is divided between Progressive and Martin units, these being served by a battery of Weltronic controller cabinets mounted overhead. Arc welders are of latest type Lincoln Electric Fleetwelders.

Noteworthy, too, is an impressive installation of Bull-Dog bus duct, 640 ft of Lo-X-2000 amp welding distribution bus, and Trol-E-Duct, Hi-cycle power lines on the trim lines and body-in-white, running a total of 4000 linear ft in length for power tools and hoists.

As bodies are completed on the body-



BODIES

in-white line, they are hoisted off the floor conveyor, mounted on an overhead mount fixture, and begin the trip on the monorail feeder conveyor to the paint shop on the second floor.

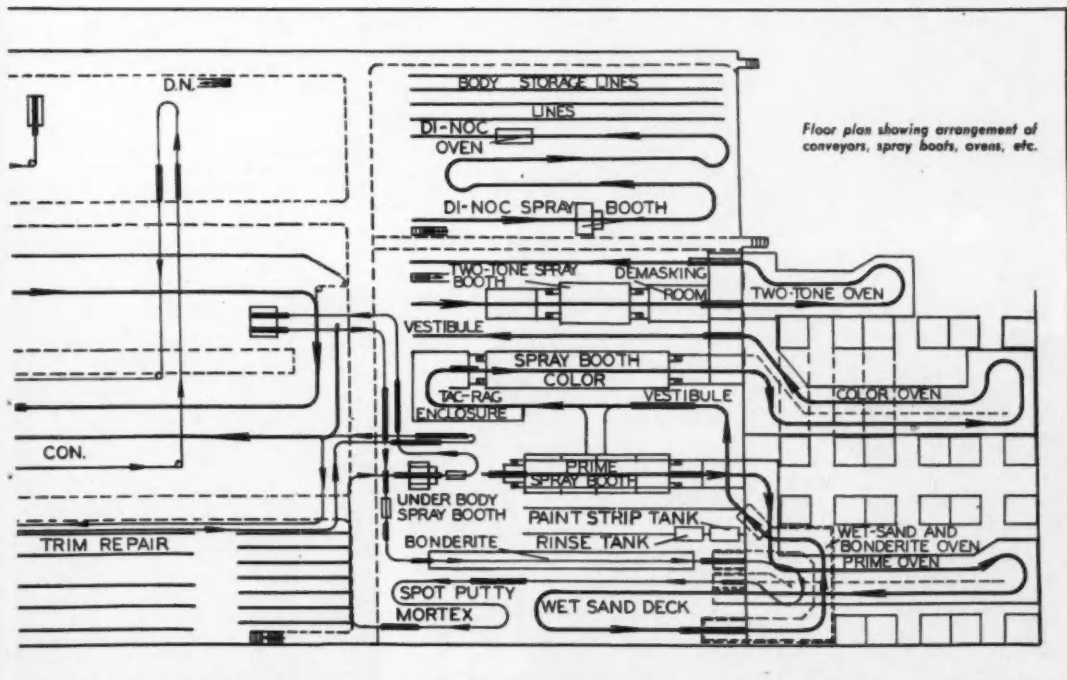
Since the second floor layout is too complex to visualize from a word description, we have reproduced a simplified line drawing of the floor plan to make the operations easier to follow. As the bodies are delivered from the first floor through the opening in the floor, they come to the six-stage Bonderite machine installed by Peters-Dalton. This unit runs 152 ft in length. Upon leaving Bonderite

Table II—Data on Spray Booths and Ovens

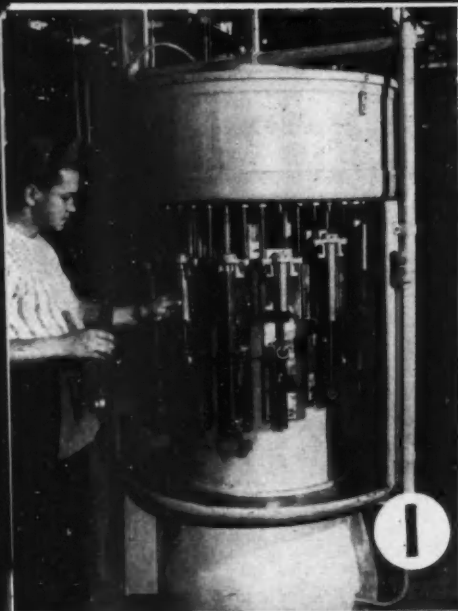
Equipment	Length (ft)	Exhaust Air (cfm)	Fresh Air (cfm)	Heater Cap (btu-hr)	Recirculated Air (cfm)	Temperature
Prime Spray Booth	80	160,000	171,250	19.5-million	.....	.....
Color Spray Booth	100	200,000	211,250	23.1-million	.....	.....
Two-Tone Spray Booth	40	80,000	91,250	9.5-million	.....	.....
Prime Oven	360	13,300	.....	.....	.....	350F
Zone 1	.....	.....	.....	5.0-million	32,000	.....
Zone 2	.....	.....	.....	2.8-million	16,500	.....
Zone 3	.....	.....	.....	1.8-million	19,500	.....
Color Oven	371	13,300	.....	.....	.....	260F
Zone 1	.....	.....	.....	5.0-million	32,000	.....
Zone 2	.....	.....	.....	1.8-million	16,500	.....
Zone 3	.....	.....	.....	1.8-million	23,000	.....
Two-Tone Oven	200	6,250	.....	.....	.....	260F
Zone 1	.....	.....	.....	2.8-million	23,000	.....
Zone 2	.....	.....	.....	1.8-million	16,500	.....
Wet Sand Oven	146	5,000	.....	5.0-million	26,000	350F
Bonderite Dry-Off	96	6,000	.....	5.0-million	22,500	350F

bodies continue directly into the dry-off oven, starting at the exit end of the Bonderite machine, rising to an upper level and looping 180 deg to enter spot putty, and Mortex stations at the side as shown in the floor plan.

(Turn to page 124, please)



Making Chrysler's



1 Developed by Chrysler, this special machine is designed to fill shock absorbers with a metered volume of special fluid, the operation being entirely automatic.

2 These individual multi-spot-welding machines handle the spot welding of the dust tube cover on the assembly.

3 Typical of the arrangement of sub-assembly benches is the one seen here for preparing the piston rod sub-assembly.

4 This is a view of the big induction hardening machine used for selective hardening of the center portion of the piston rod.

5 Another of the new welders is the seam welder shown here. It is employed for welding of the lower end of the shock absorber assembly.

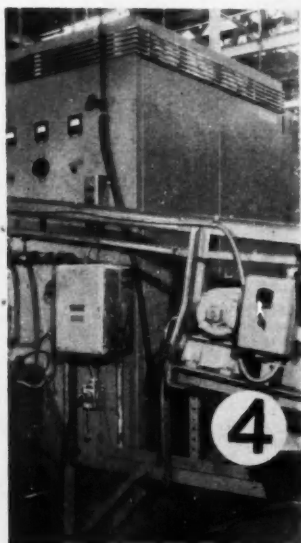
6 Upper mounting rings are welded to the shock absorber tube in the machine shown here.



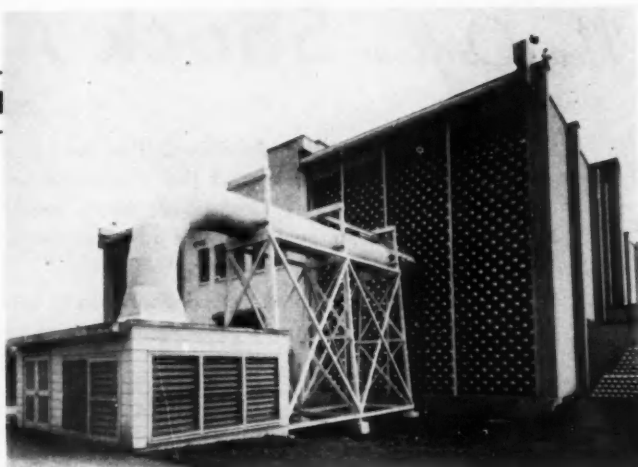
New Oriflow Shock Absorbers

With the introduction of the Oriflow shock absorber on 1951 Chrysler Corp. cars, it is of interest that the new shock absorbers are being produced in the New Castle, Ind., plant. Tooling for Oriflow required considerable new equipment and advanced methods, including a variety of specialized welding operations.

Some impression of the many interesting operations at New Castle may be gained from the sampling illustrated here.



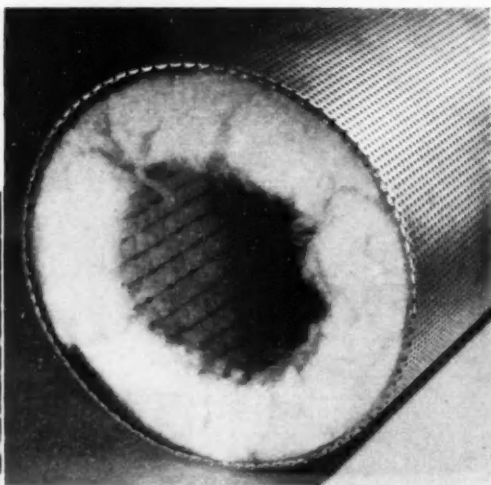
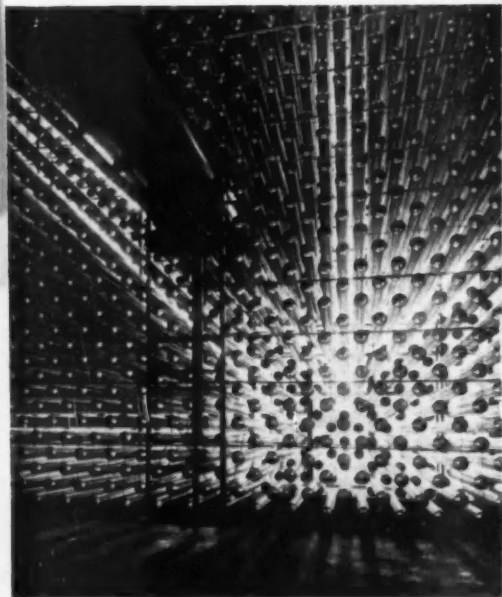
Here is an outside view of a test cell at the Curtiss Propeller Division, Caldwell, N. J., in which 3600 sound absorbers are installed. These units provide 61,200 sq ft of acoustical area. Shown also are the cell's auxiliary cooling blower and duct. Similar acoustical systems are in use also at: U. S. Air Force, Wright-Patterson Field, Dayton, Ohio; U. S. Naval Air Station, Banana, Fla.; Wright Aeronautical Corp., Woodbridge, N. J.; British Aero Engines, Ltd., Vancouver, B. C.; Piedmont Aviation Corp., Winston-Salem, N. C.; and Argentina Air Force bases at Cordoba and El Quatro.



Silencing Aircraft Engines

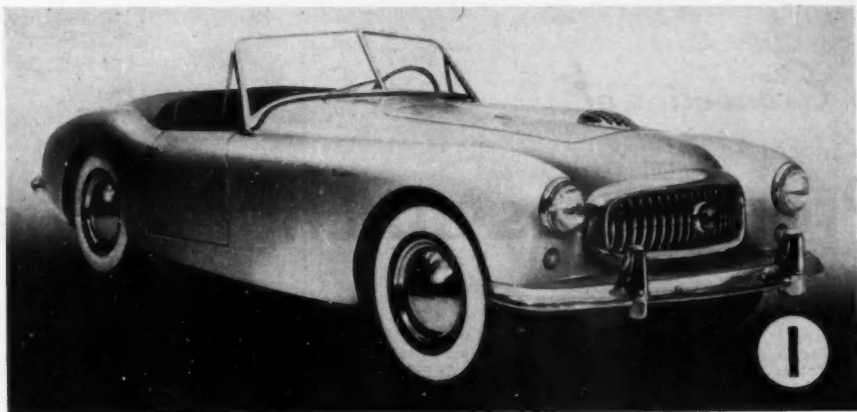
Below—

A new acoustical system for aircraft engine test cells has been devised by Janke & Co., Mackensack, N. J. This view shows how the sound-absorbing units—named Py-Dee—are suspended by cables in staggered rows at the intake end of a test cell at the Curtiss Propeller Division, Curtiss-Wright Corp. The same setup is used at the exhaust end of the cell.



Above—

This cutaway view shows construction of Janke's Py-Dee sound absorber. It consists of Fiberglas TWF insulating wool wrapped around a center cylinder of hardware cloth and covered with a Fiberglas mat, and an outer cylinder of corrosion-resistant perforated aluminum. Each 7½ ft cylindrical unit provides 17 sq ft of perforated acoustical area.



Nash Healey Sports Car

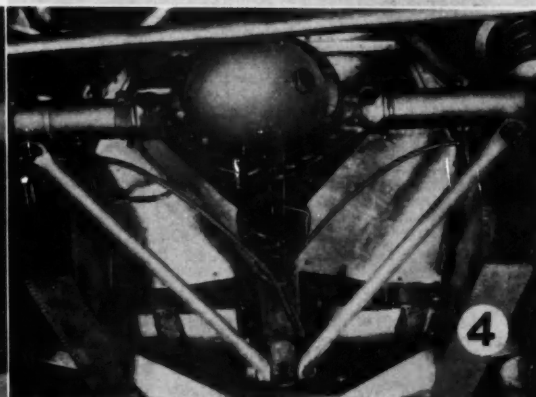
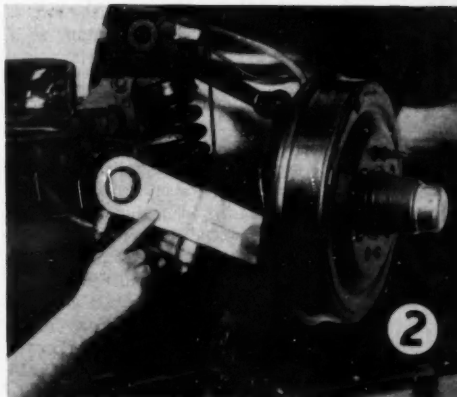
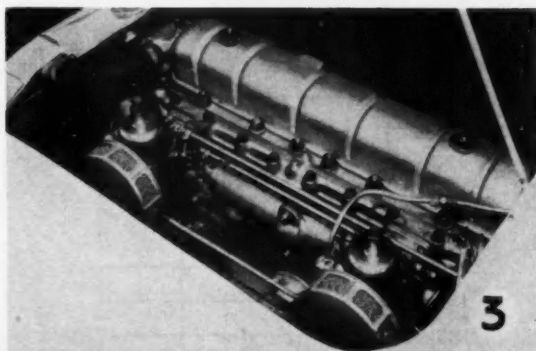
1. Nash Motor's 1951 Nash-Healey, a fast two-passenger sports car, has a curb weight of about 2600 lb., a wheelbase of 102 in., an overall length of 170 in., and width of 66 in. Estimated top speed is 125 mph. Transmission is three speed, with overdrive. First showing will be at the Chicago Automobile Show, Feb. 17. Engine and other major mechanical units will be made by Nash, the bodies by Donald Healey Co. in England. Cars are to be assembled by Healey, then imported into U. S. and sold by Nash dealers.

Has 125 mph Top Speed
With 125 hp Engine

2. This is the Healey trailing link front suspension used in the new car. Each wheel is mounted on a swinging arm pivoted ahead of the wheel centerline.

3. The Dual Jeffre Ambassador 234.8 cu. in. six-cylinder engine has overhead valves and is equipped with a new type aluminum head, two horizontal S.U. (British) carburetors and other major modifications for high speed. Compression ratio is 8.1 to 1, and output is 125 hp at 4000 rpm using premium fuel.

4. The box section frame is particularly massive, as indicated in this underside view of the rear end. Coil type rear springs are employed, and drive is through a torque tube.



The Economics of

Propane as an Engine Fuel

THE use of liquefied petroleum gases as fuels for internal combustion engines is not a new development. LP-gases have been used as motor fuels in Southern California and the Southwestern states for more than 15 years. Today there are more than 2000 vehicles operating on these fuels in California alone. During this time experience has proved that they are not only excellent fuels for internal combustion engines, but have some definite advantages over other liquid fuels. As a result of this experience and an increasing availability and wider distribution, the last few years have seen a rapid increase in the use of LP-gases as engine fuels in the bus and truck fields.

LP-gases, consisting primarily of propanes and

butanes, are hydrocarbons which are gases at normal atmospheric temperatures and pressures, but which may readily be liquefied by the application of moderate pressures. In Table I the properties of LP-gases are compared with gasoline and Diesel oil.

Until recent years, the oil and gas industry considered LP-gases to be a necessary evil of little value and they were disposed of by burning or flaring. This was the situation when they were first used as engine fuels and consequently no great effort was made to utilize them to their maximum efficiency. LPG was burned in gasoline engines with no, or at best only moderate, increase in compression ratio. Butane was preferred to propane because of its lower vapor pressure. Occasional difficulty was experienced with "wild" fuels due to poor control during production that permitted the inclusion of excessive quantities of non-condensable gases as ethane and methane.

In more recent years, the picture has changed. The passage of laws designed to conserve our valuable natural resources prohibit the wasteful practice of flaring and force the oil and gas industry to find a use for the materials or put them back in the ground. Butane has developed to be a valuable raw material used in the manufacture of synthetic rubber. Also, considerable quantities of butane are blended with gasoline for sale at gasoline prices. Hence, the availability of butane as a low price engine fuel is uncertain.

It is different with propane. No good use for this material has been found except that of burning it as a fuel for heating or power generation. Although some propane is blended with gasoline, due to its high vapor pressure, very little can be utilized in this manner.

Hence, the trend today is toward the use of straight commercial propane as the LPG fuel for internal combustion engines. The potential availability of the fuel is far in excess of any foreseeable market demand; and although at present its distribution is not uniform, the distribution situation is im-

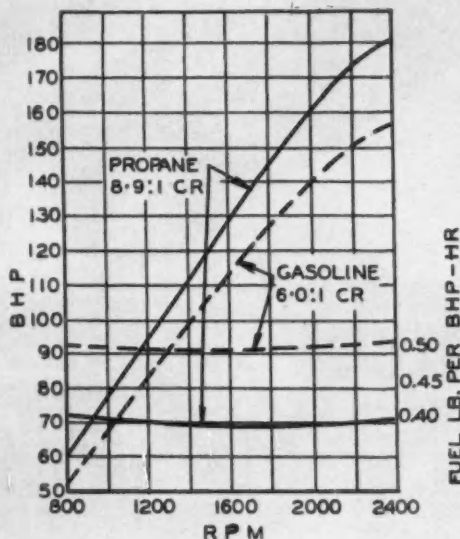


Fig. 1—Results of dynamometer test on a 477 cu in., six-cyl. heavy-duty gasoline engine and the same engine converted to propane.

By
A. T.
Browne

Project Engineer,
ACF-Brill Motors Co.

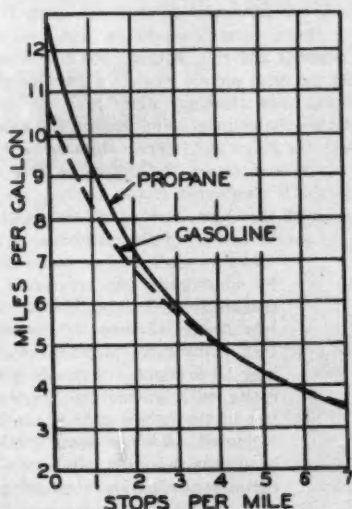
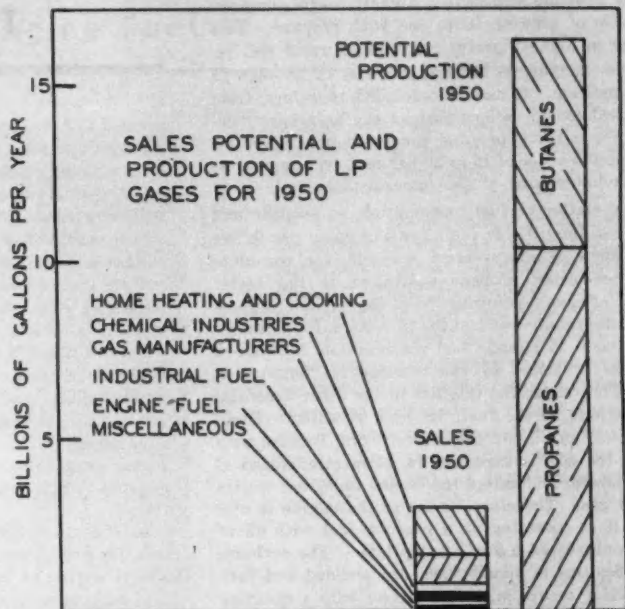


Fig. 2—Graph of the results of fuel economy tests using a 36-passenger city bus, powered by a 477 cu in. engine, with full seated load.

proving and will continue to improve as the market expands. It is to be expected that the use of propane as an engine fuel will continue to increase, as we have on one side the producer endeavoring to develop a market for a surplus product and on the other the bus and truck operators eagerly seeking a means of introducing operating economies.

Propane has proved itself to be an excellent fuel for internal combustion engines. Compared to gasoline and Diesel oil, it is at some disadvantage because of its lower heating value per gallon, but only because these fuels are sold by the gallon. However, it does have compensating advantages in its excellent anti-knock characteristics (octane rating 110 plus) and high volatility.

The thermal content of a fuel in Btu per gallon is no indication of its power-producing ability. What counts is the heat of combustion of the air-fuel mixture per cu ft. A cu ft of air-propane mixture has virtually the same thermal content as a cu ft of air-gasoline mixture. The power output of a carbureted engine depends upon the heating value of the charge of air-fuel mixture drawn into the cylinders and the thermal efficiency of the engine. As there is little difference in the heating value of air-propane and air-gasoline mixtures, the ratios of the thermal efficiencies of the two engines will be a measure of the relative power outputs. A heavy-duty engine which has a

highest useful compression ratio of six to one when burning gasoline will have a highest useful compression ratio of nine or 10 to one with propane. This increase in highest useful compression ratio will result in an increase in thermal efficiency of between 15 and 20 per cent. It may be concluded, therefore, from theoretical considerations that an engine properly designed for burning propane should show a power increase on the order of 15 or 20 per cent over an equivalent gasoline engine of the same displacement.

In the matter of fuel consumption, as propane and gasoline differ little in their heating value per lb, we would expect an improvement in specific fuel consumption when using propane equivalent to the better thermal efficiency resulting from the greater highest useful compression ratio of the fuel. Actually, a greater improvement in specific fuel consumption is obtained than that indicated by the increase in compression ratio. The reason for this lies in the other beneficial characteristic of the fuel; its high volatility. Probably "volatility" is not the correct word, because with propane the fuel is vaporized in a converter ahead of the carburetor and enters the engine induction system as a dry gas. Therefore, as far as the engine is concerned, it is operating on a gaseous fuel with all of the advantages of a fuel of this type. The carburetion difficulties of liquid fuels are avoided and intimate mixing occurs in the carburetor with a resulting uniform air-fuel ratio to all cylinders. With propane a cold, streamlined, low-velocity manifold may be used with an improvement in distribution and volumetric efficiency. Also, with a gaseous fuel the usual transitory variations in air-fuel ratio of the gasoline engine which occur with changes in throttle opening are avoided. The correct air-fuel ratio determined in the carburetor reaches the cylinders unchanged. These facts add up to a very appreciable improvement in specific fuel consumption on the well-designed propane engine which compensates for the lower density of propane.

Fig. 1 shows the results of dynamometer tests on a gasoline engine and the corresponding engine converted to propane. This was a heavy-duty, six-cyl engine of 477 cu in. displacement. The compression ratio with gasoline was six to one, which was in-

The Economics of

creased to 8.9 to one for propane. As this was strictly a conversion job, the only changes made to the engine were a piston change to increase the compression ratio and the removal of the heat from the hot spot. It will be noted that the power increase varies from 12 to 15 per cent with an improvement in specific fuel consumption in the neighborhood of 25 per cent.

Comparative tests on the fuel consumption of a 36-passenger city bus in which these engines were installed are illustrated in Fig. 2. It will be noted that there is little difference in the mpg fuel consumption between the gasoline and the propane powered vehicles. Incidentally, these curves are not to be taken as a quantitative measure of the fuel consumption in revenue service. The tests were made at maximum performance and revenue operation should show a better economy which will vary with the operating conditions.

In Fig. 3 are illustrated comparative performance data for a 44-passenger city coach using a heavy-duty, six-cyl engine of 700 cu in. displacement. Compression ratio is six to one with gasoline and nine to one with propane.

Propane is a very clean burning fuel with beneficial effects upon engine maintenance. Because of the facility with which a gaseous fuel mixes with air and the absence of heavy ends difficult to vaporize, almost complete combustion occurs. Consequently, carbon formation is virtually non-existent. Propane has no tendency to form varnish or sludge, and combustion chamber deposits and ring sticking are minimized.

Probably the most serious wear in a gasoline engine occurs during cold starting, when raw unvaporized gasoline enters the cylinders and washes the lubricating oil from the rings and liners. Because with propane no liquid ever enters the cylinders, this cause of engine wear is eliminated.

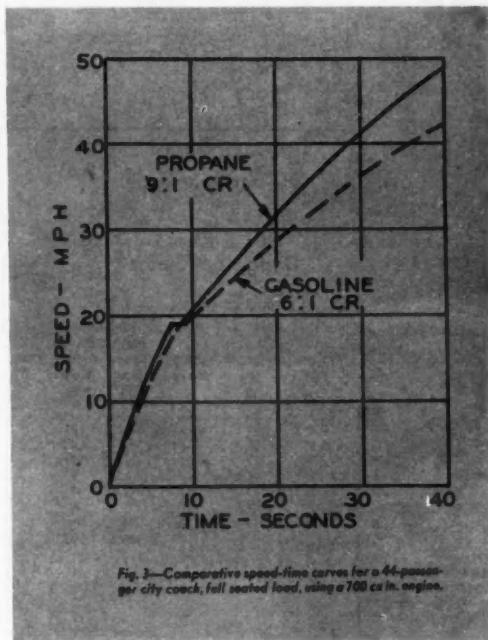
As a result of the clean burning characteristics of propane, the contamination of the crankcase oil with abrasive soots and carbon particles is minimized. As no liquid fuel reaches the cylinders, thinning of the lubricating oil does not occur. In fact, experience indicates that there may be a slight increase in oil viscosity with use due to fractionization of the lighter ends of the lubricating oil. A lower viscosity oil may be used with benefit. Because of the complete combustion when using propane the exhaust is very clean. There is an absence of aldehydes, and the result is that the exhaust is virtually invisible and without odor.

Operating experience proves that the effect of this on engine mileage is to increase the time between en-

Table One Typical properties of commercial motor fuels.

	Commercial Propane	Commercial Butane	Regular Gasoline	Diesel Oil
Heat content Btu/lb	21,700	21,400	20,380	19,500
Heat content Btu/gal	91,730	101,340	121,700	137,000
Weight per gallon, lb	4.23	4.74	5.97	7.0
Octane number (motor)	110	94	78	.....
Initial boiling point F	-58	0		
Vapor pressure @ 60 F	163	35		
@ 100 F	187	69		
@ 130 F	277	111		

Propane as an Engine Fuel



gine overhauls by 50 per cent and to double the mileage between oil changes.

Equipment Costs

The cost of converting existing vehicles to propane operation will vary, depending upon the completeness of the conversion and any difficulties which a specific vehicle may present to its installation. To get the maximum performance and economy from the fuel, an appreciable increase in compression ratio is necessary. Whether this increase in compression ratio involves a piston change, a head change or both will influence the cost. The fuel tanks, being cylindrical in shape and filled only to 80 per cent of capacity, require more space than gasoline tanks of equal

capacity. This may pose a problem of finding a suitable fuel tank location which does not involve too much modification of the coach structure.

Currently, manufacturers are quoting prices for conversion kits from \$300 to \$800, depending upon the amount of modification material included. These are complete kits, including carburetor, converter, fuel tank, LPG fittings, engine modification material, and tank supports.

An operator converting to propane will have an initial investment to make in storage and dispensing equipment. Propane storage tanks are desirably above-ground installations. The cost of these facilities will vary, but is estimated to run between \$0.50 and \$0.80 per gal installed.

Economical Fleet Size

What is the minimum size of fleet for economical operation? Unfortunately no generalization can be made which will be applicable to every specific operation. Availability of the fuel and the basis upon which it must be purchased to obtain an attractive price vary with different localities and must be considered by each operator in the light of his own operation.

(Turn to page 108, please)

Table Theoretical savings analysis Two for a fleet of 50 coaches.

Coaches operated.....		50
Miles operated per coach per year.....		35,000
Total miles operated per year.....		1,750,000
Fuel	Gasoline	Propane
Cost per gallon.....	.16	.11
Economy mpg.....	3.5	3.8
Economy cpm.....	4.58	3.15
Saving with propane cpm.....		1.43
Total annual fuel saving.....		\$25,000
Lubricating oil		
Oil used—gallons.....	2,250	1,100
Cost @ \$1.00/gallon.....	\$2,250	\$1,100
Saving with propane.....		\$1,100
Maintenance		
Saving with propane @ 1/4¢/mile.....		\$8,750
Total savings.....		\$34,850
Capital investment		
Cost of conversion \$400/vehicle.....		20,000
Storage and dispensing equipment, 10,000 gal.....		6,000
		26,000



New styling features of the B-3 Series include two horizontal grille louvers, redesigned wrap-around bumpers, and a lower hood line for greater driver visibility.

Horsepower and Torque Increases Dodge B-3 Series Truck Engines

B-3 Model	Displacement (cu in.)	Comp. Ratio	Net bhp	Increase Net hp	Net Torque lb ft	Increase Net Torque
B, C (1½, 3½-ton).....	218	7 to 1	86	4	170	5
Power-Wagon.....	230	6.7 to 1	82	4	177	.....
D (1-ton).....	230	7 to 1	89	6	181	2
DU, EU (Route-Van).....	230	7 to 1	87.5	4.5	183	2
F, G (1½-ton).....	238	6.8 to 1	93	2	184	.4
H, HH (1½, 2-ton).....	238	6.8 to 1	97.5	6.5	190	6
J, K (2½-ton).....	250	6.8 to 1	103	6	194	2
R (2½-ton).....	306*	6.4 to 1	125.5	19.5	243	19
T, V, VX (3, 3½-ton).....	331*	6.4 to 1	134.5	23	260	12
Y, YX (4-ton).....	337*	6.5 to 1	140	.....	318	.....

* Twin carburetion and exhaust.

† Single carburetion on "RS" school bus.

INCREASED horsepower and torque incident to engine improvements including higher compression ratios, and twin carburetion on high-tonnage models; improved brakes; newly designed shock absorbers; easier handling; increased GVW and GCW ratings; further comfort features; and new styling are major features of the new B-3 Series Dodge "Job-Rated" trucks for 1951. GVW ratings in the new series range from 4250 to 40,000 lb, and GCW ratings range up to 60,000 lb.

From the standpoint of mechanical improvement the biggest story is found in engine changes leading to a general increase in output. Specific data for various models are given in the table.

Considering engines, one of the changes applicable to the line is an increase in governor setting to permit an increase in engine speed on most models, thus providing higher road speeds where load conditions permit. Molded rubber spark plug covers give moisture proof ignition. Starters have increased torque. Fuel pump capacity has been increased with lower pressures.

On the engine for B and C models a new narrow wedge type fan belt replaces the conventional belt, giving longer life and quieter operation. In addition, the radiator by-pass has been removed from the top of the water pump and is made integral with the pump. A 45-amp generator is standard equipment. Generators of 35-, 50-, and 55-amp with low cut-in speeds are available as optional equipment.

The Power-Wagon engine now has improved "floating power" mountings. The former six-blade fan has

been replaced by a four-blade fan which runs quieter and consumes less power.

Increased engine output on F and G models is credited to the adoption of a more efficient 18-in. fan, running slower and using less power. The same fan, but with the addition of a shroud, is found on H and HH, and J and K engines.

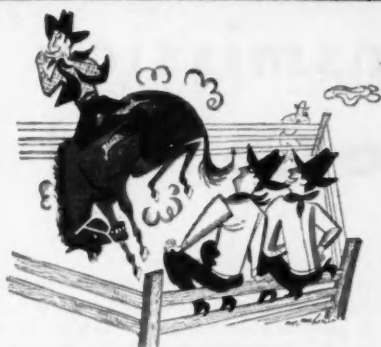
Engines for F, G, H, and HH models now have intake valves of chrome-silicon steel, said to be harder and more wear resistant. On H and HH models the exhaust system has been enlarged to reduce both back pressure and power loss. On J and K engines, a brass water distributing tube in the cylinder block replaces theterne plate tube previously used.

The engines for R, T, and V models now are pro-

(Turn to page 114, please)

Dodge Trucks

Improved for 1951



"Grigsby's been awful hard to throw since he lined the seat of his pants with slip-resistant 4-WAY Safety Plate."

For greater safety under
foot, in your plant and
on your products

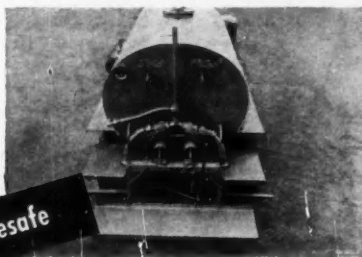
Inland 4-Way[®] Safety Plate



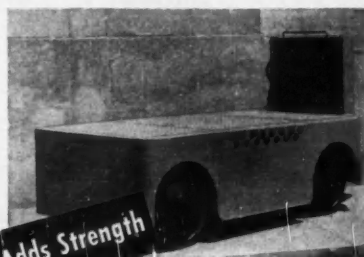
Safe Footing



Easy Cleaning



Firesafe



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data. Send for it!

Planetary Transmission with Hydraulic Control

A NEW planetary transmission now undergoing tests in several different makes of British passenger cars features smooth take-up of its hydraulically operated friction elements when a higher or lower ratio is engaged with wide open engine throttle. Designed by Hobbs Transmission, Ltd., a gear box of this type will be installed in the new Dominant coach chassis.

Control of all speeds is through a quadrant lever which actuates a valve. Through the use of two clutches and three brakes, four forward speeds and a reverse are provided by the same number of gears as were used in the Model T Ford transmission which had two forward speeds and a reverse.

Referring to the schematic illustration, clutch A and brake E are attached to the planet carrier. Clutch B and brake C control the sleeve which carries sun gear Y. Brake D is employed to lock the sun gear X. Planets at the extreme right are meshed with the output sun gear.

When the transmission is in low gear, clutch A is engaged and drives the planet carrier while brake D locks sun X. The carrier runs around the sun, and the planets rotate on their axes in the same direction. The output sun is rotated in the same direction as the carrier but at much lower speed, due to the action of the planets.

Clutch B drives the smaller sun Y, and the carrier is locked when in second gear. In this speed, planets act as countershaft gears as in a conventional sliding gear transmission.

In third speed, the carrier is driven by clutch A, and brake C locks sun Y against rotation. Action of the planets is the same as in low gear, but, because sun Y is smaller than sun X, a higher ratio is obtained at the output sun.

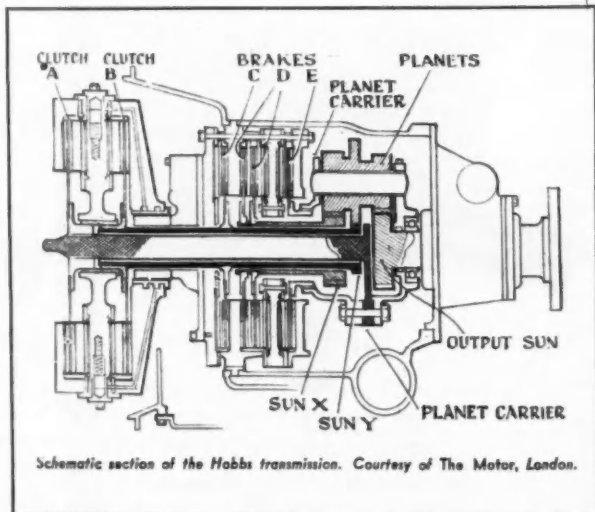
Direct drive is obtained by engaging both clutches and releasing all brakes. Planets and suns are thus locked together and all parts rotate as a unit. For neutral, both clutches are released.

For reverse, sun Y is driven by clutch B while sun X is locked by

brake D. The carrier rotates around sun X in the opposite direction to sun Y and the planet gears rotate on their axes in a direction opposite to that of the clutch. The output sun is rotated with the carrier but at a reduced speed, due to the action of the planets as in first and third speeds.

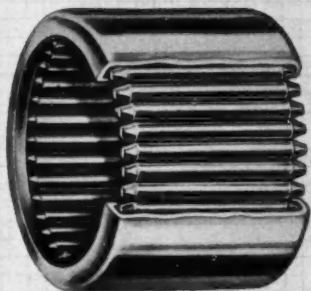
Engine revolutions do not increase appreciably when ratios are changed at any throttle opening or at any speed. Oil for hydraulic actuation is supplied by two pumps, one driven by the output shaft and the other by a sleeve in the clutch unit. A primary and a secondary relief valve limits oil pressure on brakes and clutches to that actually required for necessary torque. When oil is passed by the control valve to a clutch at any speed higher than fast idling, centrifugal action of the fluid behind the pressure plate is sufficient to provide light engagement of the clutch. This is followed by pump action; thus engagement is both smooth and positive. Fluid is fed to an annular space back of the diaphragm across a spring-loaded floating valve which is moved inward against centrifugal and spring pressure to open the supply port. When the

(Turn to page 106, please)



Schematic section of the Hobbs transmission. Courtesy of The Motor, London.

how to "baby" a mammoth



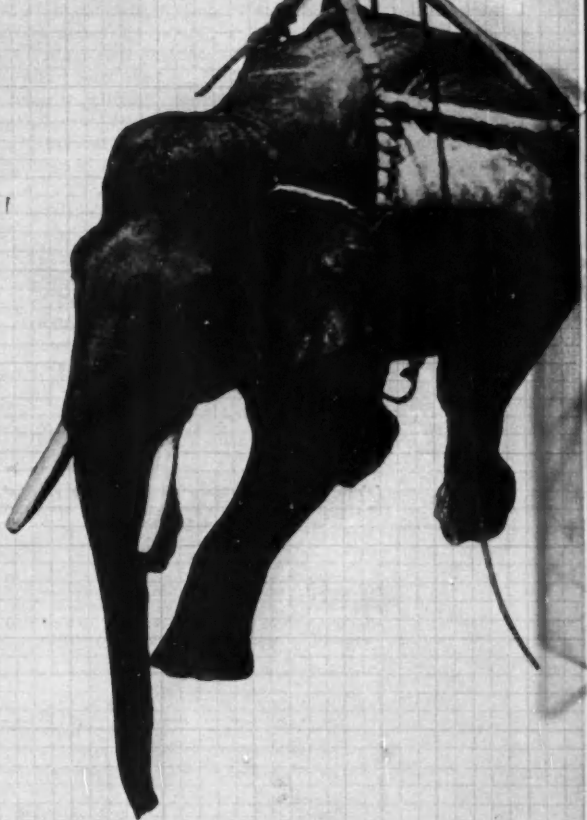
The way to handle a big load smoothly and easily with the smallest possible anti-friction unit is to use a Torrington Needle Bearing. The Needle Bearing has a higher radial capacity than any other anti-friction bearing of comparable size. We will be glad to show you what this can mean in terms of the compactness, capacity, life expectancy and all 'round performance of your equipment.

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Stepped Diameter Parts

Extruded to Close Tolerances

EXTRUSION of stepped-diameter parts such as transmission shafts, studs, and other formed automotive parts from steel bars and slugs has been a specialty of Molloy Mfg. Co., of Detroit, stemming from experience with the extrusion of rocket nozzles during World War II. The technique appears to be applicable not only to a variety of automotive shafts and parts but to many similar parts for military requirements.

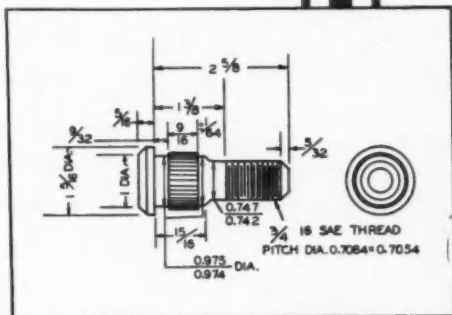
Some of the advantages of the extrusion process are quite striking. For example, once the proper slug size has been established the work is produced without scrap loss of basic material. Moreover, Molloy know-how makes it possible to hold size within 0.001 to 0.002 in. on the diameters, thus reducing machining time and chip production to the very minimum. In fact, some parts such as studs with rolled threads and serrations can be placed in service without machining of any kind.

In addition, where parts require hardened journals, the extrusion can be made from a heat treated bar. In such cases cold working further increases hardness and the part requires only selective induction hardening of journals to meet the requirements.

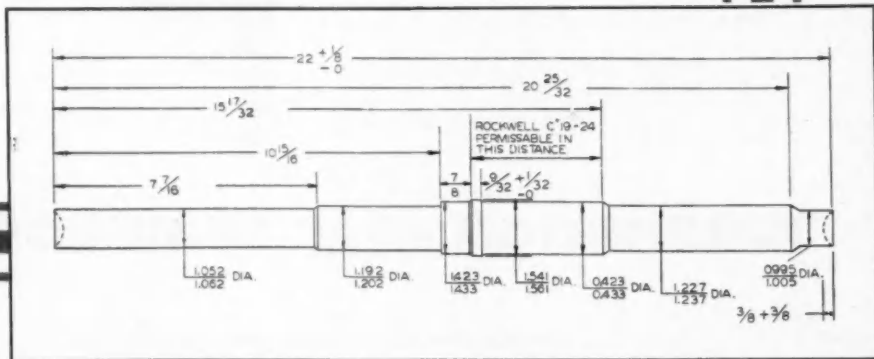
In general, the operations are performed in horizontal hydraulic presses, using cemented-carbide dies for reduction in diameter. Several specific examples should suffice to illustrate the utility of this technique. Typical of stepped shafting is the mainshaft for automatic transmissions made by Detroit Gear Div., Borg-Warner Corp. Nominally 22 in. long in the rough, this shaft is extruded completely from a heat treated bar of SAE 8645 steel

(Turn to page 104, please) -

This automotive stud is made from a small slug, extruded to produce the stepped diameters and long enough to leave stock for heading.



Mainshaft for automatic transmission as produced in a progression of three stations in the extrusion press. Diameters are held to close tolerances, thus reducing time required for machining operations on the extrusion.





Old Masters

Any automotive manufacturer with a record of forty years' consistent and continuous progress qualifies as an old master in this field. Sealed Power Corporation was founded in 1911. With the help of leading automotive engineers it has maintained steady leadership. Today's Sealed Power facilities and staff are the finest in the industry. You are urged to use them to make your good engines even better.

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By ROBERT McLARREN

Navy Solves Problem

The Air Force has gone merrily on its way developing swept-wing fighters with higher and higher speeds since V-J Day, its spacious air bases easily accommodating the longer and longer takeoff runs and higher and higher landing speeds inherent in such progress. But the Navy, restricted to the 600-900-ft lengths of its aircraft carriers, has stuck with the straight-wing airplane with its quicker takeoff and slower landing speed. The Navy cautiously investigated the swept-wing Vought F7U Cutlass but has restricted production so far to service test quantities, meanwhile exhaustively researching the problem through the use of flaps, slats, leading edge flaps, spoilers, etc. Suddenly it has reversed its field, swallowed its pride—and solved its problem—by ordering the standard North American F-86D Sabre Air Force fighter into production at the former Curtiss-Wright plant at Columbus, Ohio. (This also solved a political wrangle with the Air Force over possession of the plant.) The swept-wing Sabre is far from ideal for carrier-based operations and Navy pilots will have their hands full in getting off and aboard flat-tops with the racy fighter. But the 700-mph top speed of the plane is well beyond anything obtainable with straight-winged fighters and the Navy tacticians are willing to trade a lot of shortcomings for that tremendous speed and accompanying high rate-of-climb.

Kaiser's Fortunes

Air Force has now formalized the arrangement through which Kaiser will build Fairchild C-119 Packet cargo planes by the award of a \$10-million "down payment" to permit initial tooling of the huge Willow Run plant. Lockheed Aircraft Corp. has announced the award of a subcontract to Kaiser for the production of fuselage sections for its big P2V Neptune search plane, which means that Kaiser is receiving payments from the RFD, the Air Force and the Navy simultaneously. By a singular coincidence workers at the Fairchild plant at Hagerstown, Md., went on strike and spokesmen for both management and the union make it unmistakably clear that, at this time at least, there is not the slightest chance for agreement. Thus, Packet production has been halted at Hagerstown, Md., for weeks while Kaiser rushes the re-tooling of his plant for production of the air-

plane—selected as the standard type for not only the U. S. Air Force and Marine Corps but member nations of the MDAP program. Fairchild's fate and Kaiser's fortune seem to have been knit together into a surprisingly tight-fitting pattern.

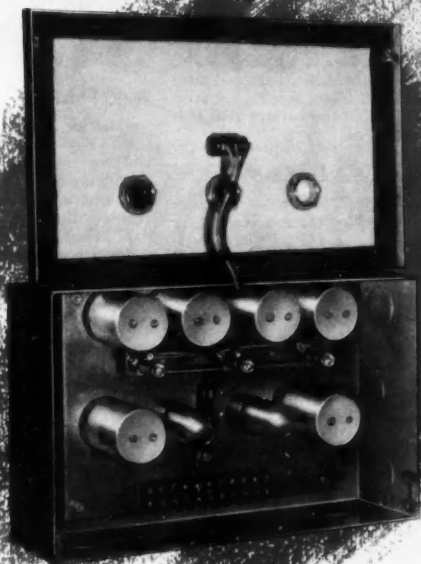
Always a Bridegroom

The "feast or famine" reputation of the aircraft manufacturing industry has long been a major deterrent to investors and especially-skilled executive personnel, neither of which cares to run the economic risk of full-time association with the industry. This reputation is being further crystallized by the pattern of recent procurement. It seemed not only logical but essential that a vast array of diverse industries be brought into the aircraft manufacturing complex during World War II and the observer viewed the effort as one born wholly of necessity. Then followed five years of economic starvation for the grass roots plants, which existed principally on the conviction that the next year or two would bring better days, that a grave international crisis would bring them the orders they needed to strengthen their finances.

When these orders arrived in 1950, however, the industry was chagrined to see a thorough-going dilution of procurement money amongst the same gamut of industries as in World War II. Obviously, here is a deliberate Governmental program and not a frantic makeshift of World War II type. After five years of lean pickings, the aircraft industry's ship has now come in and it is witnessing an unloading operation by many, many strange hands. General Motors, Ford, Chrysler, Hudson, Kaiser-Frazer and Studebaker companies are already major contractors in the new program. This is evidence of the clear intent of Pentagon program planners to enlist the aid of the automobile industry right at the outset of the expansion so that the over-all effort will be well integrated and smoothly-functioning by the time an all-out call is issued. This is far-sighted planning and intelligent programming at its best. But the fact still remains that the grass roots aircraft manufacturing industry is being bypassed in the race to get things done and that not only in famine days does it suffer as an economic proposition but now even its feast period is one of carefully-checked responsibility and opportunity for growth and solvency. While the Government eagerly converts the automobile industry from peacetime product sales to

(Turn to page 130, please)

Now! A FULL AUTOMATIC CONTROL FOR AIR STARTING DIESELS



with
**PLUG-IN RELAYS
AND TIMERS**

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**INDICATING
SIGNAL
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**OVERALL
CRANKING
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These control sets are designed for use with the larger air starting engines. The admission of the cranking air is controlled by a solenoid air valve, through the SYNCHRO-START Control Set. One crank of sufficient duration is provided, with lockout after that period to prevent exhausting the air supply. Enclosed plug-in relays and timers are used in these controls for instant service and replacement.

All standard SYNCHRO-START features, such as full safety protection while starting and running; individual signal lights; three-position selector switch; fused control circuits, etc., are provided.

Write for full information or contact your engine dealer or manufacturer.

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Automatic Engine Control Equipment

8151 NORTH RIDGEWAY AVENUE, SKOKIE, ILLINOIS



Publications

AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

A-32 Machine Tools

The Cincinnati Milling Machine Co.—Volume seven, Number five, of the company's publication "Report" contains many items of interest in respect to machine tools. There is an article on preventive maintenance, one on production milling of complex surfaces, as well as various other data concerned with the firm's products.

A-33 Spindles

Ex-Cell-O Corp.—A new pamphlet illustrates the company's spindles on a popular type surface grinder.

A-34 Motors and Generators

Westinghouse Electric Corp.—A 19-page booklet (B-4595) that describes the new Life-Line type SK dc motors and generators is now available. It shows how the new design uses rolled steel frames, heavy steel brackets, steel angle feet, and prelubricated double-sealed ball bearings.

A-35 Power Table

Niagara Machine and Tool Works—The company offers a 12-page catalog that describes their Multi-Drive Power Table for sheet metal work. Illustrations are given on the various jobs that can be performed.

A-36 Fiberglass Ducting

Arrowhead Rubber Co.—A 16-page catalog on Airtron, the company's line of flexible and rigid Fiberglass ducting, hose, sleeves and couplings is just off the press and ready for distribution.

A-37 Compressors

The Quincy Compressor Co.—The firm has recently released their new automotive catalog, Form 200, which presents a breakdown of features and specifications for all their compressors designed for automotive use. Included in the new catalog are illustrations, specifications and features of the models.

A-38 Jig Borer

Pratt & Whitney Div.—Recently made available by the company is a 12-page multi-color booklet telling about the model 4E jig borer. Complete data is given on the specifications, additional equipment and outstanding features.

A-39 Radiators

Young Radiator Co.—Catalog 1651 which describes briefly the firm's Mono-Weld radiators has just been released. Specifications and special features are listed for each unit.

A-40 Plastics

Plaskon Div., Libbey-Owens-Ford Glass Co.—New literature on alkyd molding compounds is now available from the company. The pieces are Bulletins A-3, A-4, A-5, A-6 and A-7, and are the first sections of a handbook being prepared on Plaskon alkyd molding compounds.

A-41 Tools

Carboloy Co., Inc.—A most complete and useful catalog (No. GT-250) of carbide tools and parts has just been released. The 60-page catalog covers all data in former Carboloy tool catalogs and their various supplements, as well as many items not previously carried in stock.

(Turn to page 122, please)



THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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Your Company Connection or Business

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NOW READY FOR YOU — **New YALE** *Fluid-Drive GAS TRUCKS*

*Developed to peak efficiency in
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Here's proof that YALE gives more for your money!

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Now you can get the same efficient power transmission used in expensive passenger cars. Smooth, full power at any speed—even fully loaded on ramps! No jerky stops and starts—you can work in closer quarters, cut down load breakage, reduce driver fatigue, save tires, lengthen clutch life 3 to 6 times!

Only YALE gives you this extra-power combination—hypoid gearing—65HP engine:

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"down time" for maintenance!

Only YALE gives you all these exclusive money-saving features:

Sealed automotive type hydraulic brakes give greater safety. Shockless steering provides easy "passenger car" control. Cold drawn, precision aligned uprights assure smooth, even lifting. Every vital part, in fact, has been designed and developed to give you more truck for your money.

Now, get your own on-the-job proof:

Now, when manpower, time and production are at a premium, is the time to see for yourself how much more this YALE gas fork truck can do for you. Write for all the facts today.

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Chronological History

- 1936—January 9. Los Angeles to Yosemite Valley. Distance 352 miles. Thirty cars averaged 22.473 mpg. Sweepstakes winner Graham Super-Charged 6, averaging 55.47 ton miles per gallon.
- 1937—January 7. Los Angeles to Yosemite National Park. Twenty-three cars averaged 20.8 mpg. Sweepstakes winner Graham Super-Charged 6, averaging 53.4 ton miles per gallon.
- 1938—January 13. Los Angeles to Yosemite National Park. Twenty-six cars averaged 22.8 mpg. Sweepstakes winner Graham Super-Charged 6, averaging 55.927 ton miles per gallon.
- 1939—January 5. Los Angeles to Yosemite National Park. Sweepstakes winner Studebaker Commander, averaging 55.875 ton miles per gallon. (Thirteen entrants disqualified for exceeding elapsed time limit due to severe ice and snow conditions at high elevations.)
- 1940—January 4. Los Angeles to Yosemite National Park. Distance 306.5 miles. Twenty-eight cars averaged 22.96 mpg. Sweepstakes winner Studebaker Commander 6, averaging 54.750 ton miles per gallon.
- 1941—January 9. Los Angeles to the Grand Canyon. Distance 599.3 miles. Twenty-three cars participated. Sweepstakes winner Lincoln Custom, averaging 57.827 ton miles per gallon.
- 1942—Economy Run canceled because of the United States' entry into World War II.
- 1950—Thirty-one stock cars competed in the two-day 751-mile run to the south rim of the Grand Canyon, leaving Los Angeles on February 15. All cars were impounded overnight at Las Vegas, Nevada. The cars averaged 22.074 mpg. Average speed of all cars was 41.466 mph. Elapsed running time was 18.5 hours. Sweepstakes winner Mercury, averaging 61.27 ton miles per gallon.

Longer Course for 1951

Economy Run

THE second postwar Mobilgas Economy Run, sanctioned by the Contest Board of the American Automobile Association and sponsored by General Petroleum Corp., will be conducted under slightly different rules than those in effect last year.

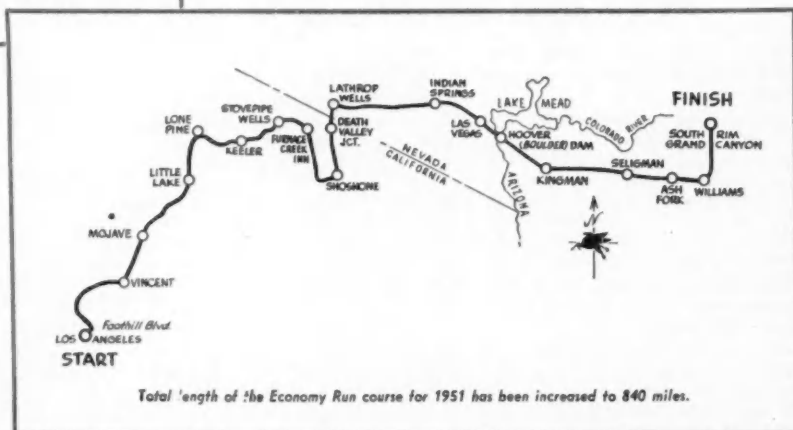
Total distance for the 1951 event, which is scheduled for March 6 and 7, will be 840.05 miles, approximately 90 miles more than the length of the course in 1950. Observers will be selected from among engineering students at California Institute of Technology and will be reassigned to a different car for the second day of the event. Starting intervals will be two minutes instead of the previous one minute intervals.

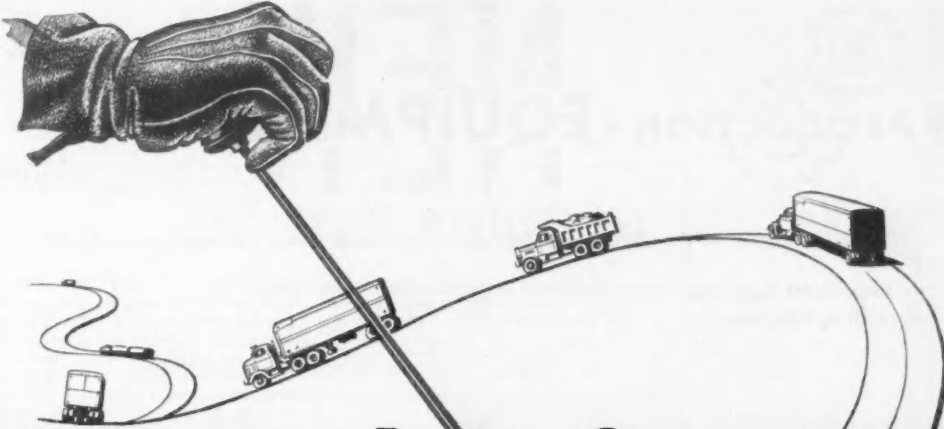
Competing cars must complete the 840 miles from Los Angeles to the south rim of the Grand Canyon within a maximum elapsed time limit of 20 hr, 55 min. Official rules and regulations require that the cars reach Las Vegas within a maximum elapsed time of 13 hr, 30 min, and that they complete the second day's driving, from Las Vegas to the Grand Canyon in seven hr, 25 min, elapsed driving time.

To insure that entries are strictly stock models, the cars are being picked by the American Automobile Association contest board officials from warehouses, assembly lines, dealer showrooms or anywhere else they may choose, without advance warning. After selection, cars will be under control of the AAA until completion of the event.

A new rule adopted for 1951 concerns ignition timing. It states that all pointers shall be checked to top-dead-center against piston travel. Fifteen deg ahead of top-dead-center

(Turn to page 116, please)





Command Performance

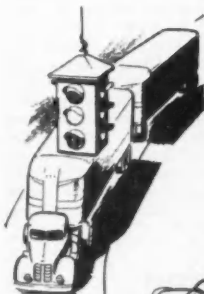
where horsepower goes to work

Hill country or city traffic . . . *command performance* is yours with a Fuller transmission or auxiliary combination in your rig. For Fuller offers you 101 transmissions and auxiliary combinations to give you *exactly the right gear ratio* for your truck—whether it be *two-tons* or the *biggest*.

With the short, smooth shifts, and right gear ratios in Fuller transmissions, your driver can keep the engine turning at its most effective speed . . . saving seconds here and minutes there to maintain higher average speeds.

That's why you will find the Fuller trademark on the gear box in more and more heavy-duty trucks.

Make your next transmission a *Fuller* transmission—and assure command performance from your rig.



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

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NEW EQUIPMENT



• PLANT •

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 54

B-19—Improved Contour Grinding Machine

Improvements incorporated in the Visual-Grind, contour grinding machine put out by the Cleveland Grinding Ma-

chine Co., Cleveland, Ohio, increase rigidity in construction, and give still greater precision. The support for the entire optical projection section is now a heavy casting of aluminum alloy. Improvements within the optical section itself consist of fins in the lamp housing to increase radiation and the dispersion of heat; lamp housing ad-

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AND EXTRA PAINT DURABILITY
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CHEMICALS AND PROCESSES.**

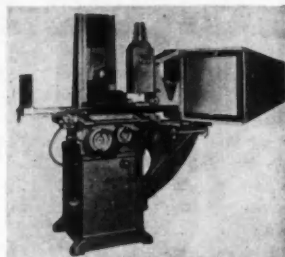


For over 1/3 of a century, ACP has pioneered in the development, manufacture, sale and servicing of protective metal-working chemicals. These chemicals preserve the metal and the paint finish of both industrial and military products. Write or call for information about ACP Rust Proofing Chemicals and Processes and how they can improve your own products and production quality.

ACP Chemicals Meet Government Specifications

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AMERICAN CHEMICAL PAINT COMPANY
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Manufacturers of METALLURGICAL, AGRICULTURAL and PHARMACEUTICAL CHEMICALS



Cleveland improved Visual-Grind contour grinding machine.

justment by hand wheel, worm gear and screw, rising and falling on dovetail ways; and a pre-set lens tube to insure positive focus. The longitudinal and cross traverse movement of the optical section is now on hardened steel ways and rollers, making adjustment easier and completely counterbalancing the entire optical system. Variable powered longitudinal feed of the table relieves the operator of hand feeding during the rough and finish grind phases. Bijur one-shot lubrication is now standard.

B-20—Universal Hydraulic Grinder

Featured on the new 1024 hydraulic grinder offered by Rivett Lathe & Grinder, Inc., Boston, Mass., is a truly universal wheelhead, swiveling 180 deg and mounting both internal and external spindles. The wheelhead is designed to eliminate dual work set-ups for internal and external grinding, the operator quickly presenting either spindle to the same work.

The new Rivett 1024 has been constructed to perform all types of grinding. Internal work includes small, large, and deep-hole grinding. External work includes straight shaft, long shaft, diameter and shoulder grinding. A feature

MEN WORKING

For manufacturers of motor cars and trucks, tractors, farm implements, mining and road machinery, automotive equipment, aircraft, heavy and light machinery and other equipment.

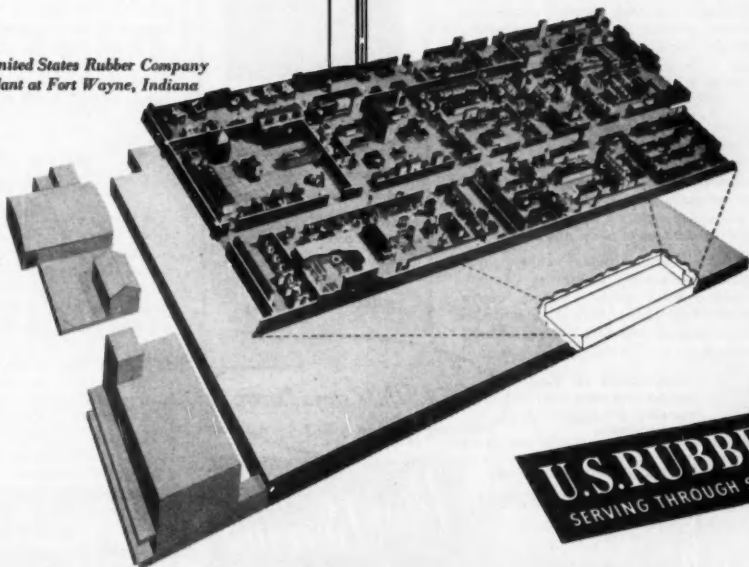
In this United States Rubber Company plant at Fort Wayne, you will find men of skill and experience ready to tackle any problems involving engineered rubber and plastic products for makers of all types of mechanical equipment with moving parts. The plant's principal business is the manufacture of engineered rubber parts for original equipment makers only—to increase the functionalism, safety or comfort of their products.

The great laboratory in this plant

is truly a treasure house of science. Here physicists, metallurgists, chemists and design engineers are always on the job... analyzing, evaluating, constantly seeking new ways to improve the performance of machinery and to make it more efficient to the user or operator.

This laboratory and its personnel constitute one more practical example of the "U. S." motto, "Serving through Science." For full information write to:

*United States Rubber Company
Plant at Fort Wayne, Indiana*

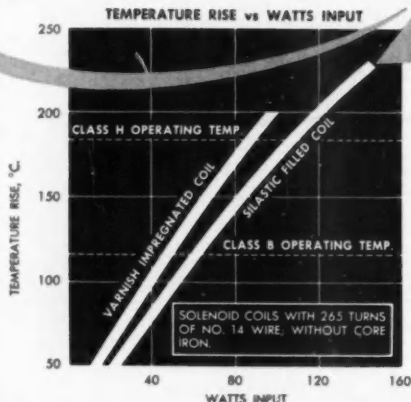


U.S. RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

FORT WAYNE, INDIANA

SILASTIC* the resilient
dielectric, stable from -60° to $+200^{\circ}\text{C}$.



dissipates heat much faster than conventional insulating materials

Here's an insulating material that gives you all of the advantages of a rubberlike dielectric at Class H temperatures, plus extreme low temperature flexibility, plus about twice the thermal conductivity of conventional resinous or rubbery dielectrics! In a solenoid coil, for example (see graph above), Silastic gives 15% more capacity than resinous silicone insulation at 180°C . That's due to increased thermal conductivity alone.

Thermal stability plus high heat conductivity permit the Silastic coil to operate at 166% of the maximum capacity for an identical organic resin impregnated solenoid. Performance of over 1600 Silastic insulated main and interpole field coils in diesel-electric traction motors is further proof of the extraordinary advantages of Silastic as a dielectric.

In coils of all kinds, Silastic provides resiliency and relatively constant dielectric properties of temperatures ranging from below -60° to above 200°C , maximum resistance to corona, to electrical and mechanical fatigue and to abrasion, oil and outdoor weathering.



Silastic insulated solenoid has 166% of the capacity of identical Class B coil plus maximum shock, abrasion and vibration resistance over a span of 260 Centigrade degrees from -60 to $+200^{\circ}\text{C}$.

from $+500^{\circ}\text{F}$.

SILASTIC stays Elastic
to -100°F .

(*U.S. Reg. U.S. Pat. Off.)



SEND TODAY! For data on the properties, performance and applications for Silastic.

DOW CORNING CORPORATION, DEPT. C-2, MIDLAND, MICH.

Please send me Silastic Facts No. 10

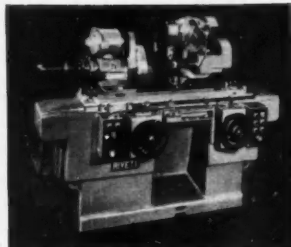
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Rivett universal hydraulic grinder, No. 1024.

providing added accuracy and speed is the mounting of draw-in collets and step chucks directly in the lathe type workhead, and the location of a lever closer to hand to reduce chucking time.

Internal spindle speed is from 6000 to 35,000 rpm. All spindles are flange mounted, sealed from grit and life lubricated. External spindle with double-row roller bearings for radial load and ball bearings for end thrust are pre-lubricated for life—of maximum rigidity to require no adjustment. Provided are micrometer table stop and fine feed for shoulder and blind-hole grinding; sine bar for setting workhead on table swivel for perfect tapers; double swivels on cross slide for two angle internal and external grinding; all grinding wheel feed controls at operator's right hand, and all table traverse controls at operator's left hand.

B-21—Automotive Piston Grinding Unit

A unit for grinding automotive or other types of pistons where a taper to the conventional relief form is required has been announced by Norton Co. of Worcester, Mass. The Norton Unit grinds the desired shape by holding the piston between centers, with the head end of the piston being carried in a dog or holder, and centered on the master cam spindle center. The bottom end of the piston is supported on a special footstock center carrying a spherical ball bearing. The footstock in which this special center seats does not rock by reason of being mounted on the rocking bar as in normal cam or shape grinding practice. It is mounted on a stationary member of the machine.

The spherical ball bearing on the footstock center becomes a pivot about which the piston revolves and oscillates according to the motion of the rocking (Turn to page 62, please)

EXTRA EMBEDABILITY

EXTRA ENDURANCE

EXTRA ECONOMY

DUREX-100 ENGINE BEARINGS

Increased embedability is the secret behind the greater endurance, the longer life, of Durex-100 engine bearings. And the matrix makes the difference. Yes, the matrix is the one important difference in construction. It is a feature—an exclusive Moraine feature—that makes a world of difference in performance, and in economy, too.

With Durex-100 bearings, embedability is not limited to the thickness of the babbitt overlay alone, as in



conventional type bearings. It is provided by the depth of the babbitt overlay *plus* the much greater depth of the matrix.

Here's how the bearing is built. First, the steel back is covered with a layer of copper and nickel metal powders. Then, a sintering process is used to form a porous matrix integrally brazed to the steel back. A thin overlay of high-lead babbitt penetrates the porous matrix, bonds mechanically and metallurgically to the steel-backed matrix. This provides far greater embedability—provides greater protection against damage from large particles of foreign matter that can get into bearings.

Extensive testing and actual use have proved the superiority of Durex-100 engine bearings. They are used as original equipment on Cadillac, Buick, Oldsmobile, GMC, and other leading makes of cars and trucks. Let Moraine give you the full story on Durex-100 engine bearings—how they can be used to advantage in the engines you manufacture. Get the details from Moraine today.

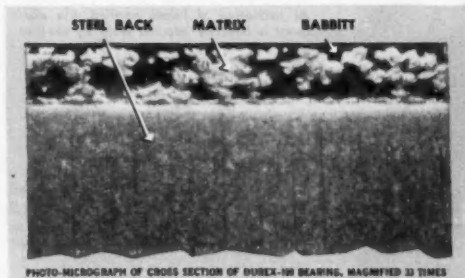


PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING, MAGNIFIED 33 TIMES

THE MATRIX MAKES THE DIFFERENCE

Steel-backed intermediate matrix of porous copper-nickel bonds mechanically, as well as metallurgically, with thin high-lead babbitt overlay.

MORaine PRODUCTS
DIVISION OF **GENERAL MOTORS**
DAYTON, OHIO

*Durex-100
Engine Bearings
by Moraine*

NEW PRODUCTION AND PLANT EQUIPMENT

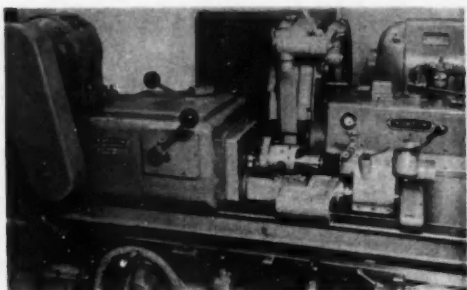
For additional information please
use coupon on page 54

Norton unit for grind-
ing pistons.

(Continued from page 60)

bar as imparted by the master cam. In-and-out motion at the footstock pivot is zero, since this is a stationary point.

Therefore, the motion and corre-



We wanted it this way. It shows two big IHC Diesels operating in dust so dense that the units are sometimes completely hidden in the swirling clouds.

Huge volumes of dust-loaded air are sucked into the air intakes that you see projecting above the power units, but it doesn't get very far. The Donaldson Oil-Washed Air Cleaners which protect these engines stop and hold close to 100% of all the dust, allowing only clean air to enter the engine.

Donaldson turbulent, double-scrubbing, cleaning action, effective under any condition, assures you of constant engine protection. It saves wear . . . helps maintain horsepower and performance.

Our engineering department will help any manufacturer with his air cleaning problem. Write or phone.

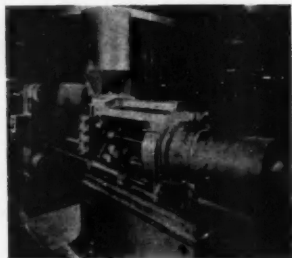
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DONALDSON CO. (Canada) LTD.
Toronto, Canada

DONALDSON
Oil-Washed
AIR CLEANERS

WORLD'S LARGEST MAKERS OF HEAVY-DUTY AIR CLEANERS

sponding amount of piston relief that is ground at any point between these centers are proportional to the distance from the footstock pivot. Thus a greater amount of relief is ground at the head of the piston than at the bottom of its skirt, which is nearer the pivot.

B-22—Plastics Injection Molding Machine



One of the new giant plastics injection molding machines, designed and built by the Hydraulic Press Mfg. Co., of Mount Gilead, Ohio, operates on a 24 hr schedule. As indication of forces applied, the material is injected into the mold by the injection plunger (foreground above) which has a maximum pressure of 20,000 lbs per sq in.

B-23—Improved Power Squaring Shears

Power squaring shear line, introduced in 1948 by Columbia Machinery and Engineering Corp., Hamilton, Ohio, is now available in a complete range of sizes in capacities of 3/16 in. up to 12 ft, 1/4 in. up to 14 ft, 3/8 in. up to 20 ft, 1/2 in. and 3/4 in. up to 14 ft, 1 in. up to 12 ft, and 1 1/4 in. by 6 ft.

A feature is the air-operated disk clutch installed in the flywheel and controlled by a solenoid through a jog switch or foot switch. Since the clutch is placed ahead of the gears, there is no motion in the gear train when the shear is not in the cutting cycle. Thus gear wear is greatly reduced and provision is made for changing the area of tooth contact to distribute the wear.

Full cutting capacity is obtained with 80 lbs air pressure. A spring-operated



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ALL-STEEL, HYDRAULIC

SEAL RINGS

*provide constant action
over full temperature range from
minus 70°F to plus 450°F*

NOT POSSIBLE WITH NON-METALLIC PACKINGS

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ATTRACTIVE COST SAVINGS!

Policy

MUSKEGON
Piston Rings

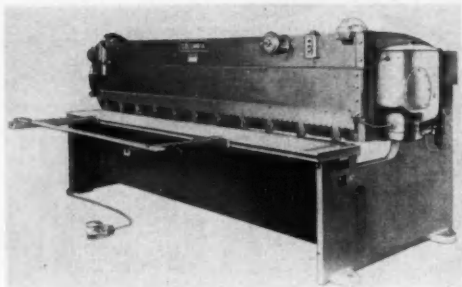
PLANTS AT MUSKEGON AND SPARTA
"THE ENGINE BUILDERS' SOURCE"

NEW PRODUCTION AND PLANT EQUIPMENT

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use coupon on page 54

disk brake, powerful enough to stop and hold the ram in any position for blade adjustment and at top position in regular cutting operation, automatically stops the shear in event of air or power failure.

Columbia power
squaring shear, im-
proved New Series.



Rams are counterbalanced and have broad, flat guides accurately scraped for a running fit against outbearings in the housing. The counterbalance exerts a slight backward pressure, holding the ram against the guide bearings at all times, eliminating floating or rubbing of the knife, regardless of wear or clearance. Spring counterbalances are used on the smaller models while units $\frac{1}{4}$ in. by 14 in. and larger are counterbalanced by air cylinders connected to an air surge tank.

All models can be equipped with ten-ft range squaring arm with steel scale and hinged gauge and stop, 50-in. range



LARGEST Monorail

Paint Finishing

System in the WORLD!

This large electrical equipment manufacturer needed finishing facilities to accommodate work varying in size from small panel sections to large power circuit breaker casings.

Peters-Dalton solved this problem by designing a batch-type system with intermittent conveyor.

Such features as dual spray piping in the cleaning inclosures, down-draft paint exhaust and revolving carriers were incorporated in this design.

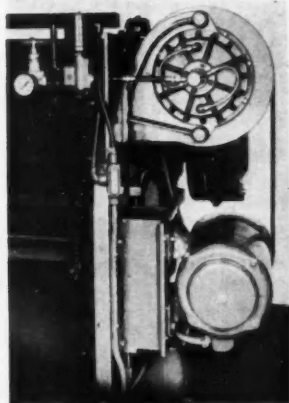
The experience and "know how" exhibited here is yours for the asking.

Direct all inquiries to

For Finer Finishing Equipment — In Any Industry — It's

PETERS-DALTON

17930 RYAN ROAD • DETROIT 12, MICHIGAN



Air-operated disk clutch installed in fly-wheel used on all New Series Columbia squaring shears.

front gauge, light-gauge for scribe line shearing and motorized front-operated micrometer back gauge with 24 or 36 in. range graduated in sixty-fourth inches. V-belt motor drive with guard fully enclosing the fly wheel and pulley and special high-torque motor can also be furnished.

A blade changing jig is furnished with models $\frac{1}{4}$ in. by 14 ft and larger and ball transfers are available for tables of models $\frac{1}{2}$ in. by 6 ft and larger.

(Turn to page 66, please)



Stainless Steels

of all analyses

SuVeneer Clad Metals

copper and nickel clad steel

Alloy and Spring Steels

and specialties

the
Specialists'
name
in fine strip steels

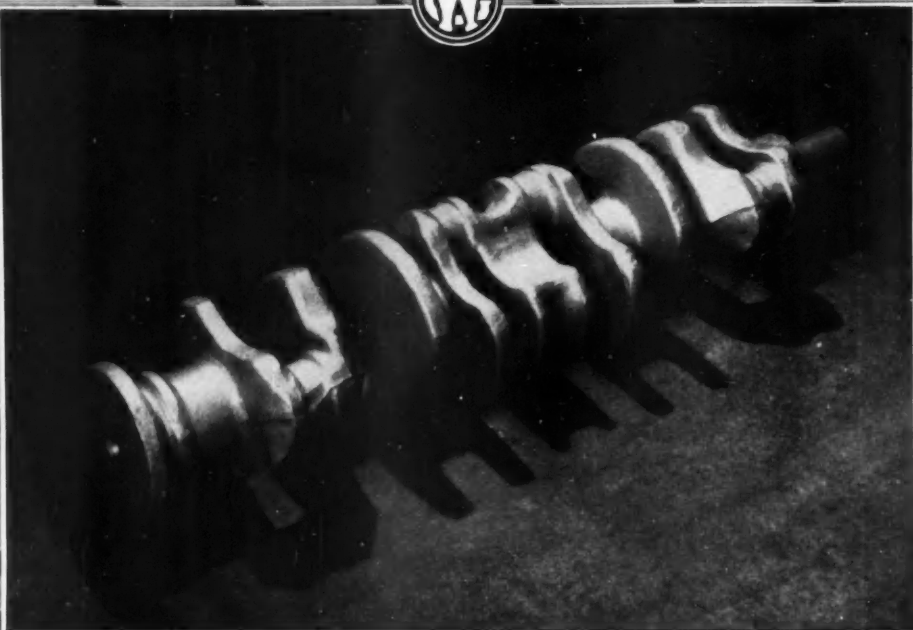
Every Superior customer benefits by the fact that our entire manufacturing concern is with quality strip steels. No other product claims a share of our attention . . . all of our experience, research, equipment and methods are concentrated solely on precision strip steel production.

That's why Superior strip behaves properly in your fabricating process—and why you can count upon Superior for consistent quality in performance, coil after coil.

Superior Steel

CORPORATION

CARNEGIE, PENNSYLVANIA



Fully counterbalanced crankshaft—the ultimate in modern forging technique . . . Wyman-Gordon . . . crankshaft forging specialists since the introduction of the internal combustion engine . . . first to forge crankshafts with integrally forged counterweights

Standard of the Industry for More Than Sixty Years

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Forgings of Aluminum, Magnesium, Steel

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HARVEY, ILLINOIS

DETROIT, MICHIGAN

STROMBERG

CARBURETORS

Judge Value As Your Customers
Will — on *Lasting
Performance!*

The performance of the car you build and sell *today* may very well be the deciding factor in some *future* automobile sale. It is just good business, therefore, to choose your engine components on the basis of *long-range economy*. In carburetors, the name Stromberg is famous for better performance—it is also a fact that Stromberg Carburetors *last longer*. Judge value as your customers will and you will agree—Stromberg® Carburetors are the logical choice.

*REG. U. S. PAT. OFF.



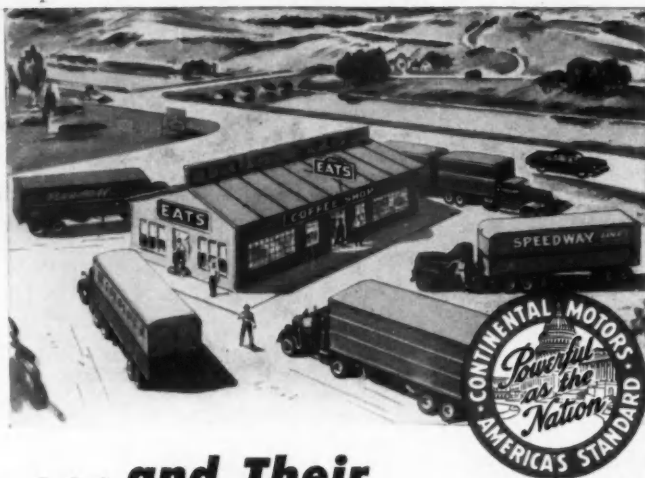
ECLIPSE MACHINE DIVISION OF

- Standard Equipment Sales: Elmira, N. Y.
- Service Sales: South Bend, Ind.

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.



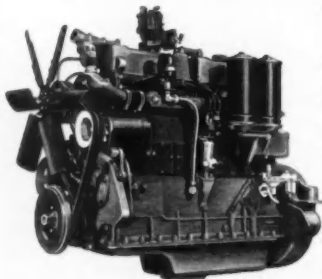
These Boys "Know Their Groceries"



... and Their ENGINES, Too

If you want hearty food and plenty of it, stop where these "Big Boys" stop. That's almost an axiom of the road. For the relative merit of the various restaurants along the route is a subject in which their drivers are naturally well versed.

Another such subject is their vehicles, of course. Listen in as drivers talk shop, and you're sure to hear strong boosts for Continental Red Seal power. They come from men who know at first hand what they're talking about.



MODEL R-600 HEAVY-DUTY ENGINE
(transportation) Six-cylinder—overhead valve
type—for trucks, buses and tractors. Delivers
110 to 160 net horsepower.

More and more heavy-duty haulers with these latest Red Seal engines are taking their place on the highways, and proving their right to that place on the solid basis of performance. They are piling up impressive records for day-after-day dependability, fast over-the-road schedules, and fuel and upkeep economy that means low ton-mile cost.

Continental Motors Corporation

MUSKEGON, MICHIGAN

NEW PRODUCTION AND PLANT EQUIPMENT

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use coupon on page 54

(Continued from page 64)

B-24—Hydraulic Piston Grinding Machine

Type H hydraulic piston grinding machine developed by Landis Tool Co., Waynesboro, Pa., for grinding the cam shaped skirt portion of automotive pistons, has a maximum capacity of 5 in. diam pistons with maximum length of 8 in. The machine can operate on semi-automatic cycle.

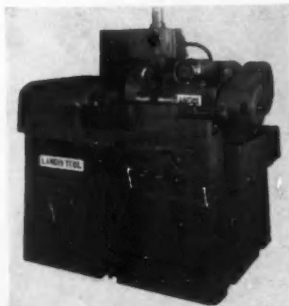
Standard wheel is 24 in. in diam with a 3 1/4 in. face, driven by a 7 1/2 hp motor. This facilitates grinding of pistons by the plunge grind method with wide wheel. It may also be arranged for traverse grinding of pistons. When traverse grinding, there is an automatic feed at each reversal of the traverse until the piston is to finish size. When using a plunge grinding cycle the feed is continuous until a predetermined size is reached, at which time the feed stops. A reciprocating mechanism reciprocates the wheel for fine finishes. It may be adjusted for amount of reciprocation and disengaged when not needed.

An overhead, hydraulically operated wheel dressing mechanism may be provided so that the grinding wheel can be dressed without disturbing the grinding set-up.

The H Type piston grinder has a new design headstock of the live spindle type with V-belt drive for smooth, even transmission of power to the headstock spindle.

The piston grinding unit has a rocking action which is necessary to obtain the cam contour on the skirt of the piston.

(Turn to page 68, please)



Landis Tool 5 in. by 8 in. Type H hydraulic piston grinding machine.

MAKE A TON OF SHEET STEEL
GO FARTHER

Specify—

N·A·X

HIGH-TENSILE STEEL

*... And
"MAKE YOUR PRODUCT
LAST LONGER"*

Now, more than ever before, America must make full use of its steel-making capacity and conserve its natural resources. Now, more than ever, there is national significance in the phrases, "Make a ton of sheet steel go farther" and "Make your product last longer."

These low-alloy, high-tensile steels do "make a ton of sheet steel go farther"—for their inherently higher strength is 50% greater than mild carbon steel. That means, in turn, that 25% less section can be used with safety, and

where rigidity is important, this can usually be compensated for through slight design change.

"Make your product last longer" is no idle claim. The much greater resistance of N-A-X HIGH-TENSILE to corrosion, abrasion, and fatigue assures longer lasting products even at reduced thickness.

Explore the potential economies to be derived from the use of low-alloy, high-strength steels—and then specify them. Their use can add materially to our national conservation program.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division, Ecorse, Detroit 29, Michigan

NATIONAL STEEL



CORPORATION

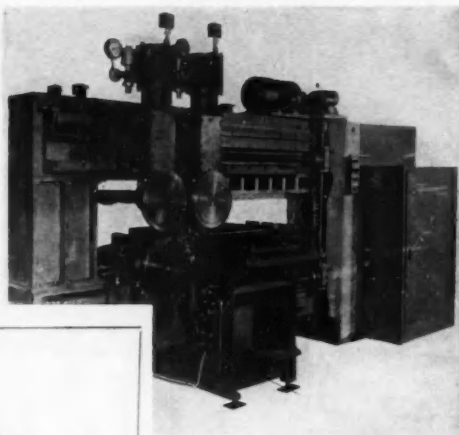
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Sciaky press type mash
welding machine,
PMM-2TL.

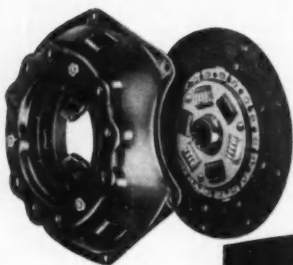
B-25—Mash Type Welding Machine

A press type mash welding machine
designed by Sciaky Bros., Inc., Chicago,



You can depend on —
BORG & BECK®

CLUTCHES... for that vital spot where power takes hold of the load!



Engineered by
BORG & BECK means...

CLUTCHES EXPERTLY DESIGNED
AND PRECISION BUILT
BY CLUTCH-MAKING
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BORG & BECK DIVISION
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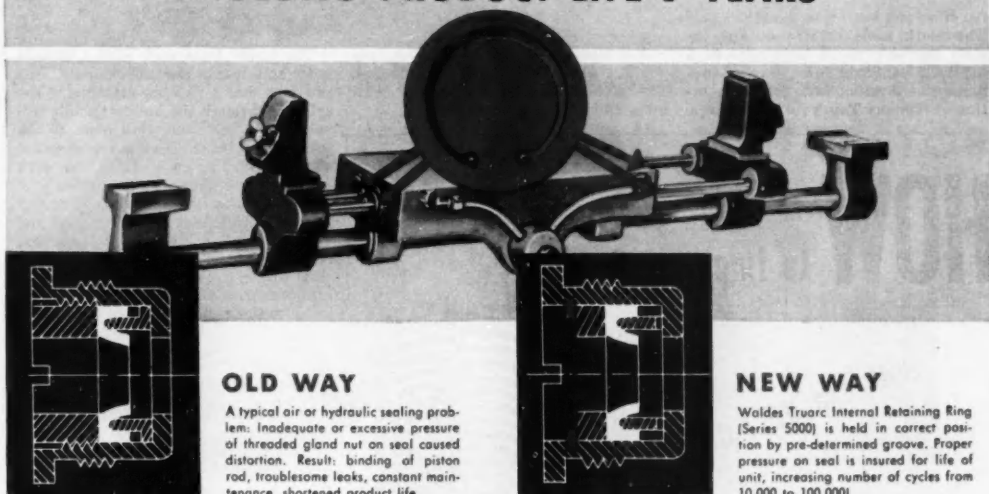
Ill., joins 28 in. widths of mild steel sheets to form a continuous line for various mill operations. "Mash" welding, the company explains, a relatively new process of resistance welding technique, employs either a seam or projection type welder to obtain a clean, smooth, end-to-end joint without metal overlap or protruding metal on the joined edges of the sheets. This technique is said to eliminate the "flash" made by conventional resistance-butt welding methods—which requires grinding or machining to remove the upset flash material. In "mash" welding, the amount of overlap is limited to approximately $1\frac{1}{2}$ times the sheet thickness. Welding pressure is correspondingly increased to almost twice that required for conventional seam welding.

The Sciaky PMM-2TL machine incorporates the Sciaky three-phase system, and is equipped with a locating and clamping table to automatically locate the sheets to a proper overlap and hold them securely for the welding operation. Immediately following the welding, two steel idling wheels perform a rolling operation which reduces the overlap of the two sheets to a minimum thickness. This thickness can also be controlled by varying the amount of pressure provided by the upper head assembly. The operator need only insert the ends of the sheet to be welded to a stop between the electro-magnetic clamping bars and depress a control button. This clamps the sheets securely and rocks the clamped piece parts with a preadjusted overlap to the welding position.

B-26—Work Positioner For Welding

Designed for automatic welding, a new positioner put out by Aronson Machine Co., Arcade, N. Y., provides a solenoid actuated clutch that allows instant start and stop of the work table. The welding machine and the work table can be synchronized to start at the

**4 TRUARC RINGS CUT ASSEMBLY TIME 40%
CUT UNIT COST 25%
PROLONG PRODUCT LIFE 9 YEARS**



OLD WAY

A typical air or hydraulic sealing problem: Inadequate or excessive pressure of threaded gland nut on seal caused distortion. Result: binding of piston rod, troublesome leaks, constant maintenance, shortened product life.

NEW WAY

Waldes Truarc Internal Retaining Ring (Series 5000) is held in correct position by pre-determined groove. Proper pressure on seal is insured for life of unit, increasing number of cycles from 10,000 to 100,000!

Using 4 Waldes Truarc Retaining Rings in their Check-N-Spect Air Power Units (for tire inspection and repair) saves Bowes Seal Fast Corp., Indianapolis, 40% in assembly time, 25% in cost. With Waldes Truarc Rings, assembly is simple...maintenance unnecessary. New design increases unit life from 1 to 10 years!

Redesign with Truarc Rings and you too will cut costs. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better job of holding parts together.

Truarc Rings are precision-engineered...quick and easy to assemble and disassemble. Always circular to give a never-failing grip. They can be used over and over again.

Find out what Truarc Rings can do for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

Waldes Truarc Retaining Rings are available for immediate delivery from stock, from leading ball bearing distributors throughout the country.

REDESIGN WITH 4 WALDES TRUARC RETAINING RINGS BRINGS THESE BIG SAVINGS...

- Eliminates skilled-labor milling and threading operations
- Eliminates maintenance
- Gives greater accuracy in positioning seal
- Saves 40% in assembly time \$.09
- Cost of old-type parts24
- Less Cost of four Waldes Truarc Rings . .08
- Net savings on parts16

TOTAL UNIT SAVING . . \$.25

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WALDES TRUARC RETAINING RINGS ARE PROTECTED BY THE FOLLOWING PATENT NUMBERS:
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Waldes Kohinoor, Inc., 47-16 Astor Place
Long Island City 1, N. Y.

AY-023

Please send selector guide catalog (4k-w)
on Waldes Truarc Retaining Rings.

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Title _____

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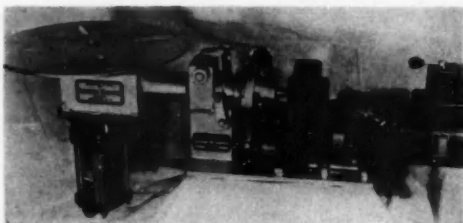
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Aronson welding work
positioner, Model
14BT500.



same time one button is pushed.

The work table rotates at any infinitely variable speed from zero to 5 rpm. Back-lash, said to be reduced to a minimum, allows smooth, jerk-free rotation on Timken Taper roller bearings.

The work table can be tilted in any position about 360 degrees and locked. The work arm can be any length to suit up to 16 in.

The model illustrated has an air cylinder attached to the table spindle. This provides that a pull-bar attached to the cylinder through the hollow spindle will permit clamping the work piece to the table. The advantage of the holding device is the speed with which the work piece can be attached to the table.

The model 14BT500 is suited for any automatic, semi-automatic, manual arc, heli-arc, brazing, etc., applications that require a smooth rotation with instant start and stop synchronized work table rotation.

Weight capacity rating is 500 lbs.

HOW ^{your} to Improve Product

with the HELI-COIL® INSERT



Product improvement invariably results from the use of Heli-Coil Inserts in all threaded assemblies. The Heli-Coil Insert protects all threads from wear, seizure, corrosion or failure.

Your customers, too, will praise Heli-Coil Inserts, because they eliminate down time, repairs, and complaints caused by failing threads or weak assemblies.

Heli-Coil Inserts . . . precision-formed coils of stainless steel or phosphor bronze wire . . . conform to S.A.E. standards, and are made in the full range of National Coarse and National Fine Thread Series; also in pipe thread and spark plug sizes. They are easy to install, economical, and permanently protect all threads.

Use them in original design or salvage . . . in all metals, plastics, wood . . . for a permanent trouble-free screw thread.

HELI-COIL CORPORATION



Heli-Coil Corporation
47-133 Thirty-Fifth Street, Long Island City 1, N. Y.

Please send me
Bulletin No. 650,
on Design Data.

NAME

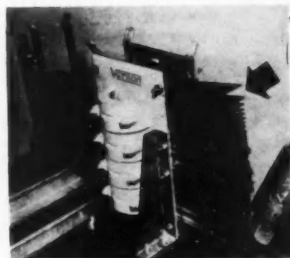
FIRM

STREET

CITY ZONE STATE

B-27—Magnetic Sheet Separator

Difficulty in separating sheets of steel for feeding into stamping presses and press brakes is eliminated by means of a new moderately priced non-electric, permanent-type plate magnet unit recently announced by the Verson All-steel Press Co., Chicago, Ill. Known as the Verson magnetic sheet floater, the unit is said to substantially speed up sheet handling. Glove damage and injury to workers in the form of cuts from sharp sheet edges is also reduced.



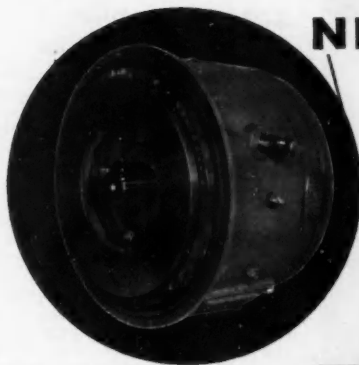
Verson magnetic sheet separator.

In construction, the sheet floater consists of powerful Alnico magnets, a stainless steel mounting bracket and a stainless steel wearing plate welded into a single, compact unit. In principle, the sheet floater induces a magnetic field in the sheets in such a manner that the sheets repel each other causing the ends to float or fan out with air space between them. Separated in this manner the top sheet can easily be grasped by the worker and fed into the press.

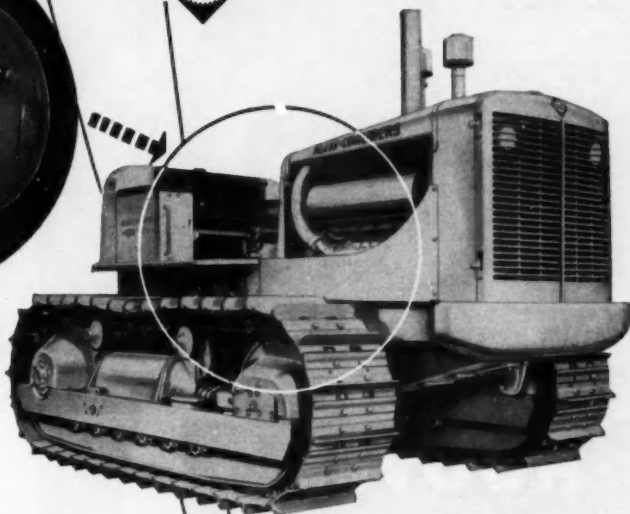
The number and size of units re-

CONVERTING POWER

in the more powerful
NEW  HD-20 TRACTOR



A Model CF-100-20 Twin Disc Clutch Type Hydraulic Torque Converter multiplies the torque developed by the GM-6-110 Diesel in the new Allis-Chalmers Model HD-20.



Five years ago, Allis-Chalmers introduced the nation's *first* tractor with power transmitted through a hydraulic torque converter. *The converter was a Twin Disc.*

Now, Allis-Chalmers introduces an even more powerful torque converter tractor, their new Model HD-20. *Again*, the torque converter is a Twin Disc.

There's plenty of reason for choosing a torque converter—virtual elimination of gear shift guesswork for the operator, the engine always turning at its most effective rpm, *automatic* and *instant* selection of the right power for the pull—plus absorption of shocks and jolts that otherwise would jar the drive line and engine.

And, there's even more reason for choosing Twin Disc. For the

Twin Disc Hydraulic Torque Converter is the industrial torque converter which multiplies engine torque more than five times at stall.

That's why you find Twin Disc Torque Converters converting power in the new A-C HD-20, and in more and more other types of construction equipment, too. Write today for complete details. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin.

Clutches & Hydraulic Drives

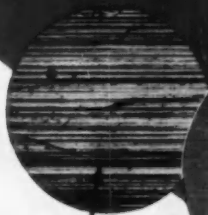


TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

AUTOMOTIVE INDUSTRIES, February 15, 1951

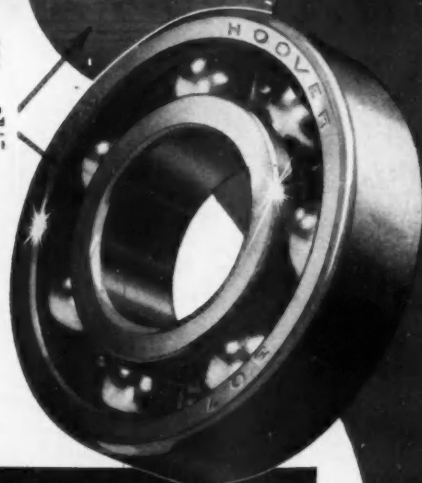
Nothing is as smooth as a
HOOVER HONED RACEWAY*



POLISHED
Polished Raceway surface
magnified 100 times as
used in other ball
bearings

***HOOVER HONED**
Raceway surface magnified
100 times, as used exclu-
sively in Hoover Ball
Bearings.

It's the
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that
makes the
difference



HOOVER
America's only
BALL BEARING
with Honed Raceways

90% longer life
30% greater load
Amazing Quietness



The Aristocrat
of Bearings

HOOVER BALL AND BEARING CO.

ANN ARBOR, MICHIGAN

NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please
use coupon on page 54

quired and their positioning depends upon the size, weight and shape of the sheets. Blanks and irregular shapes can also be separated.

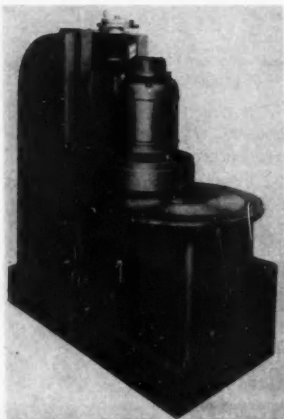
B-28—Double Disk Grinding Machine

The Gardner Machine Co., Beloit, Wis., announces a double disk grinding machine, Model 2V-18, of a size and type to grind two parallel flat surfaces on small work pieces in one operation. It finishes small coil springs, carbon brushes, ceramic materials and similar small parts.

Two 18 in. diam solid center abrasive disks are each driven by 3 or 5 hp motors. Disks are each 2 in. thick. The 32 in. diam rotary work carrier is made to suit the types and sizes of work pieces to be ground. Finger tip speed control is provided for an infinite range of work carrier speeds between $\frac{1}{4}$ and 1 rpm. A bayonet lock for the rotary work carrier permits rapid change of the carrier plate when changing work set-up or dressing the disks. An outboard bearing under the rotary work carrier is used to insure extra stability to this flat revolving plate.

Both grinding heads may be independently adjusted by graduated hand wheels. Each head may be tilted for progressive grinding.

Path of the work pieces is directly across the center of the abrasive disks. With this method, a solid disk may be used instead of a conventional type with a center hole.



Gardner double disk grinding machine,
Model 2V-18.



AT THE ELBOW of the nation's mightiest fleets...in the service departments of tens of thousands of America's largest automotive repair shops...SUN Motor Testers and other SUN Scientific Testing Instruments are playing a vital role in strengthening the service arm of the nation to meet every emergency.

By substituting "Testwork" for "Guesswork", over 50,000 shops equipped with SUN Testing Instruments are helping to keep America's transportation system rolling. They are prolonging the life of needed motor vehicles... are saving

hundreds of thousands of precious man-hours and conserving the nation's highly skilled manpower.

For over a score of years, SUN has applied this background of scientific knowledge to industrial, military and governmental needs. SUN produces literally thousands of precision testing instruments for the nation's leading car factories, engine builders and other vital industries.

Further, SUN stands ready and willing to work with any agency in strengthening the service arm of the nation.



An Army of over 300 SUN Field Representatives keep the SUN Testing Program in high gear. They provide on-the-job training for thousands of

mechanics yearly... they service equipment and keep a constant check on the efficiency of scientific testing procedures. To insure a

constant supply of highly skilled advanced operators, SUN also maintains 15 strategically located Technical Training Schools.



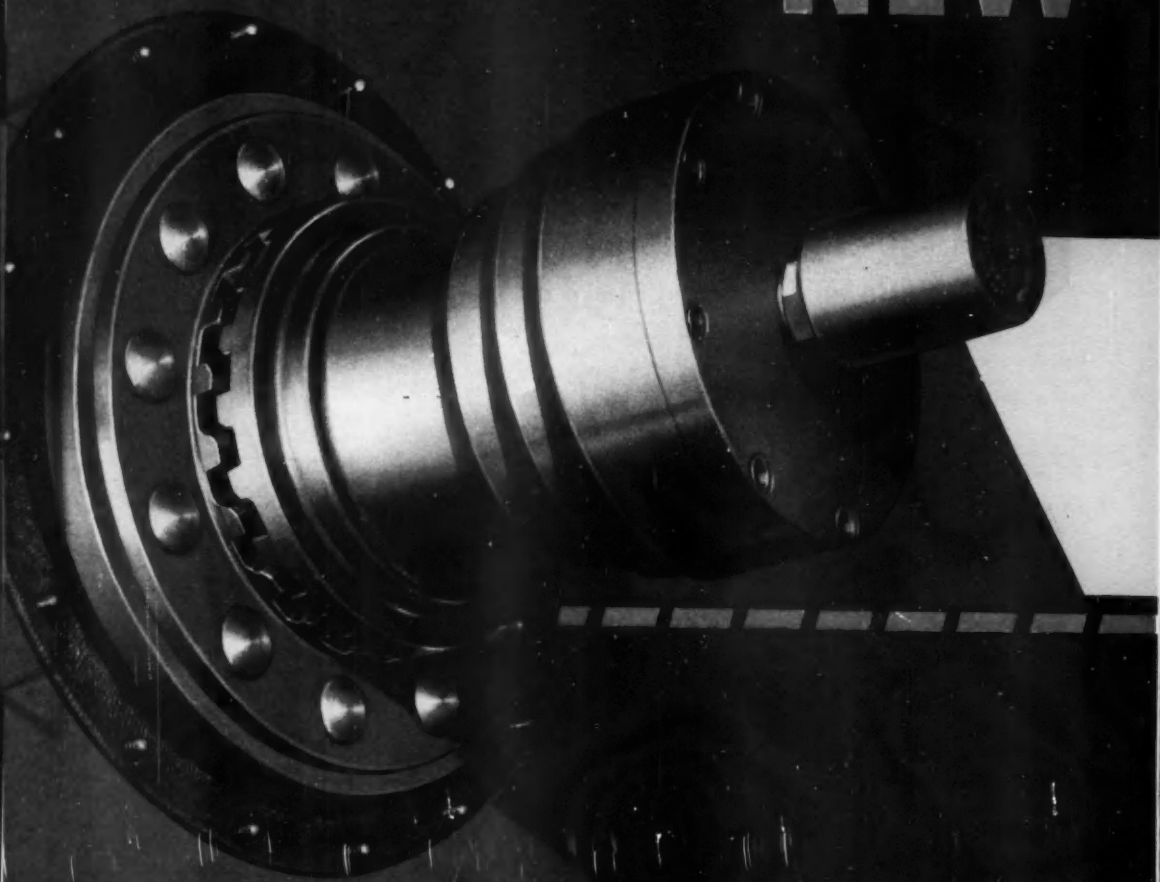
Sun

ELECTRIC CORPORATION
6373 Avondale Avenue, Chicago 31, Ill.

B-5010

NIAGARA

NEW



This most revolutionary improvement in press design since Niagara introduced the world famous sleeve clutch in 1934 has been in the process of development and testing for many years. It is patented and

there are patents pending.

Its high hourly output... its sturdiness... its simplicity... its labor saving and maintenance economies... its safety features... are amazing.

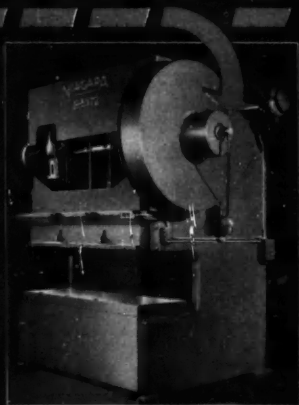
PRESENTS

SLEEVE CLUTCH

electrically controlled air actuated *DeLuxe Control*

Note each one of these outstanding features:

- 1 Has all the advantages of a friction clutch.
- 2 Has all the advantages of a Sleeve Clutch.
- 3 Can be engaged or disengaged at any point in the stroke.
- 4 Can be jogged through the full 360° of crankshaft travel.
- 5 Can be stopped instantly, regardless of position of crank, by stop button, electric eye, limit switch or high frequency electric field.
- 6 Can be operated by palm buttons, foot switch or push buttons.
- 7 Can be operated single stroke or continuous.
- 8 Provides positive drive.
- 9 Has no friction members to wear.
- 10 Generates no heat.
- 11 Has low air consumption.
- 12 Makes instant engagement.
- 13 Provides effortless operation.
- 14 Is located on outside of drive wheel.
- 15 Can be completely removed without taking off the drive wheel.
- 16 Drive wheel next to frame . . . minimum overhang.
- 17 Drive wheel runs on antifriction bearings.
- 18 Gears and clutch run in a bath of oil.
- 19 Has few moving parts. Integral jaws and splines.
- 20 Presses so equipped are provided with air releasing brake.



For Double Crank Gap Presses



For Straight Sided Presses



For Inclinable Presses

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK
DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK

NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 54

C-44—Large Diameter Cylinders

Large diam cylinders of 15, 30, and 195 tons lifting power are now being offered by Miller Motor Co., Chicago, Ill.

The 20 in. diam model air cylinder produces over 30 tons of lifting power at rated operating pressure of 200 psi. This is the counterbalance type of air cylinder of particular use on presses and other heavy production machinery, and is also available in 18 in., 16 in., 14 in., 12 in., 10 in., and 8 in. bores. These are in addition to the standard line of Miller air cylinders available in 1½ in. to 14 in. bores, the 14 in. bore model having an output thrust of over 15 tons at 200 psi.

At its rated 2500 psi operation under shock load conditions, the 12 in. bore model high pressure hydraulic cylinder produces over 140 tons of thrust and, in non-shock load conditions, produces over 195 tons of thrust at 3500 psi operation. These type cylinders are available in sizes down to 1½ in. bores.

Like their smaller models, these large diam cylinders have non-breakable solid steel heads, caps, and mountings, scratch-resistant, hard chrome plated piston rods, piston rod dirt wipers, precision-honed barrels of 15 micro in. finish, and self-regulating, wear compensating, leakproof and tamperproof seals that never require adjustment. The standard air and the counterbalance type air cylinders have non-corrosive brass barrels to eliminate rust from air moisture. The cylinders are offered in a wide variety of convenient mounting styles and, with the exception of the counterbalance type air cylinders, are available in double rod end styles also.

(Turn to page 78, please)



For all practical purposes that's exactly what you do with TUNG-SOL Signal Flashers.

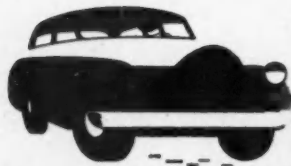
During twelve years to date almost 10,000,000 TUNG-SOL Flashers have been used in automotive signal systems. So few have been the service replacements, that the vast majority of these Flashers were literally "installed and forgotten."

There is nothing surprising in this, considering the unequalled mechanical vitality of TUNG-SOL Flashers. The basic simplicity of their design—only one moving part—practically guarantees trouble-free service. They operate efficiently under the voltage varia-

tions encountered in automotive service and they have ample ruggedness to withstand vibration and shock.

And remember—the TUNG-SOL Signal Flasher is the only device of its kind which permits use of the important instrument panel indicator light.

There are numerous types of TUNG-SOL Signal Flashers, each designed for a specific circuit requirement. All of them are small and may easily be located in confined space. Write for the TUNG-SOL Signal Flasher Bulletin. TUNG-SOL LAMP WORKS INC., Newark 4, N. J. Sales Offices: Atlanta, Chicago, Dallas, Denver, Detroit, Los Angeles, Newark.

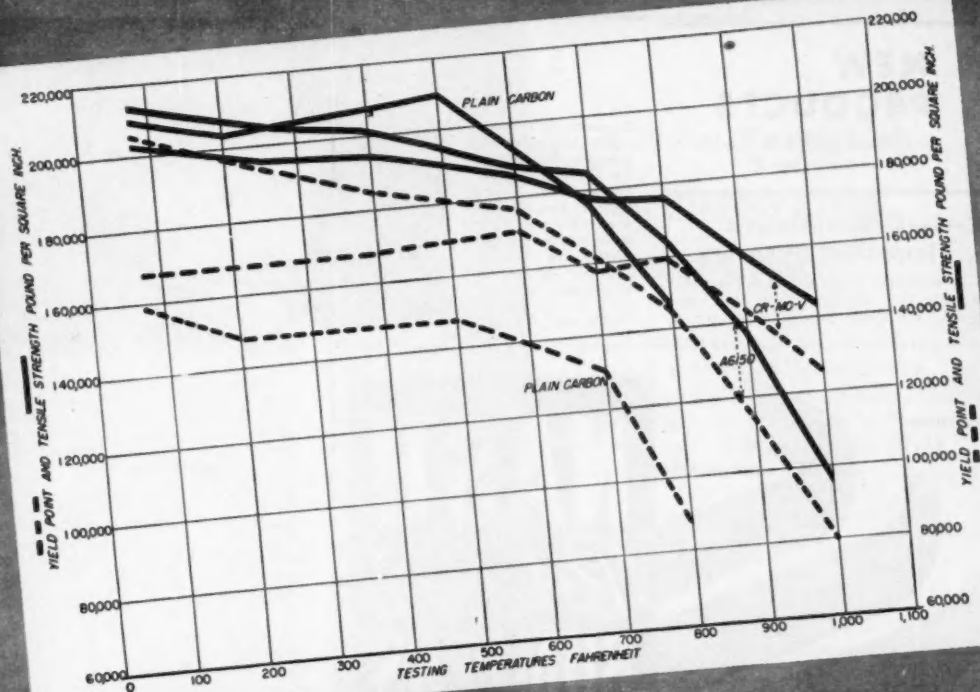


TUNG-SOL
SIGNAL FLASHERS

ALSO AUTO LAMPS, ALL-GLASS SEALED BEAM LAMPS AND ELECTRON TUBES



Miller Motor Co. large diameter cylinder.



HIGH TEMPERATURE PROPERTIES of Cr-V and Cr-Mo-V Spring Steels

SPRINGS FOR SERVICE at elevated temperatures require steels which resist softening and lowering of the yield point. Unless hardness and yield strength are stabilized by correct alloy additions to the steel, these properties deteriorate rapidly as the temperature is raised.

The chart above shows the yield point and tensile strength of three types of spring steel at elevated temperatures determined by standard short-time tension tests.

Springs of plain carbon steel are sometimes used at moderately elevated temperatures, although their lower yield values prevent them from giving service as satisfactory as that of the alloy spring steels.

Chromium-vanadium steel springs, such as AISI 6150, give better service at ordinary temperatures because of the higher yield point. In addition, they may be used at operating temperatures up to about 700° or 750° F

because they retain high yield point values as the temperature is increased.

Chromium-molybdenum-vanadium steel was especially designed for springs operating at temperatures in excess of 750° F. It can be used for springs operating at temperatures as high as 850° F or even higher under some conditions. At 800° F, the yield point of this steel is still greater than that of plain carbon steel at room temperature.

If you have a problem in spring applications at elevated temperatures, our metallurgical engineers will be glad to help you solve it.

MAKERS OF
ALLOYS



CHEMICALS
AND METALS

VANADIUM CORPORATION OF AMERICA

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NEW PRODUCTS

For additional information please use coupon on page 54

C-45—Crystal-Electric Inspection Discovery

A discovery that promises to make possible for the first time the high-speed, automatic x-ray inspection of

Demonstrating the automatic, high-speed, inexpensive, highly sensitive G-E crystal detection technique is Dr. Rudolph Frerichs, Northwestern University Physics Dept. scientist, who is running a blast powder-fuse train through the holder to which is attached the "crystal eye." Dr. John



E. Jacobs, research engineer of G-E X-ray Corp., rests hand on the relay box in which a bell rings when a discontinuity is detected in the fuse train powder. Not shown are a low-powered X-ray unit and control used to supply the X-radiation.

FULL-FORM

WRAP-AROUND

REGULAR FORM

NASH

BROS.

Body-Gard BUMPERS

CUSTOM-BUILT FROM

HI-TENSILE STEEL

CHANNEL TYPE CONSTRUCTION

Flexible tooling and equipment assure economical prices and PROMPT DELIVERY on small or large quantities of Body-Gard Bumpers. They are available for the front and rear of all types of trucks, truck bodies, buses, coaches and all other commercial vehicles.

Send for further information explaining how easy it is to order custom-built bumpers to your exact specifications.

5 FACE WIDTHS:

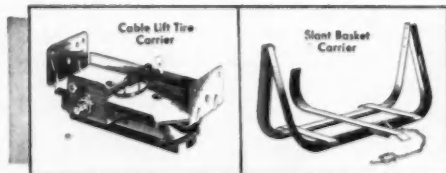
3½", 4½", 5½", 6" and 6¾" wide

3 STYLES:

REGULAR—With 3½" end form

FULL—With end form up to 7½"

WRAP AROUND—End form as deep as required



NASH TIRE CARRIERS

Cable Lift Carriers available in Under Frame, Side Mount and Frameless Types. Slant Basket Carriers, universal for any rim or any make of steel wheel.

For replacement or original equipment write for folder.

NASH BROS. COMPANY

2125 DEWEY AVENUE, EVANSTON, ILLINOIS

thousands of industrial products is announced by the General Electric X-Ray Corp., Milwaukee, Wis. It may also be used to improve the performance of medical diagnostic and therapeutic x-ray apparatus.

The "heart" of the new inspection system is a tiny crystal, known as a "semi-conductor," which can be grown in size from a fraction of a millimeter to several millimeters in cubic size. When excited with x-radiation, it acts as an amplifier tube, releasing torrents of electrons that can be used to operate various types of mechanisms.

The crystals amplify the energy they receive 1,000,000 times! As "million-to-one" crystals, they thereby become new industrial "slaves," it is pointed out. On an area-for-area basis, for instance, they are over 1,000,000 times more sensitive to x-rays than are ionization chambers which are commonly used to measure x-radiation. They are over 1000 times more sensitive than photoelectric cells, such as those used in "electric-eye" applications.

These extremely sensitive crystals are stable, and instantly respond to variations in the intensity of x-rays. Because of the 1,000,000-to-1 gain permitted by the crystals, they do the work that hitherto required a much more complex system of vacuum tubes and amplifiers, while at the same time allowing the use of low-intensity x-rays.

The scientists believe that the use of crystals as sensitive energy converters and amplifiers opens up a new field of crystal-electric engineering.

A prototype of the new system is about to be delivered for a test on a certain strategic military production problem, and pilot laboratory models have been built to inspect the continuity of powder trains used in blasting fuses.

The crystal-electric method promises to perform at unprecedented speeds, ranging as high as 600 units per minute in the case of canned foods and liquids! Operating as a sort of industrial "slave eye," the crystals may solve many kinds



A New Yardstick for Piston Ring Performance

PC's solid chrome plated rings have set a new standard of piston ring performance. New applications of solid chrome plating, perfected by Perfect Circle, more than double the life of pistons, rings and cylinders.

They are the yardstick by which all other rings are measured.

Today, more than 90% of all solid chrome plated piston rings installed as original equipment are Perfect Circles.

**Perfect
Circle**

*The Most Honored Name
in Piston Rings*

Kester Solder



Flame Soldering with Kester "Nosput" flux-core solder. One of Kester's specialized industrial solders that does this job better than any other solder.

No Waste

"Nosput" flux-core solder is only one member of Kester's famous group of flux-core solders. In all there are over 100,000 different types and sizes.

Efficient

Kester can supply the right solder for the job, virtually eliminating waste and rejects. Call in a Kester expert and have him analyze your customers soldering operations.

Kester Solder Company
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Send for free manual:
"SOLDER and Soldering
Technique"

**KESTER
SOLDER**

Standard for Industry since 1899



NEW PRODUCTS

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of inspection problems, including controlling and checking the product level in containers; detecting voids, cracks, cavitation and variation in material thickness in a wide variety of homogeneous materials; checking for absence, misplacement or misalignment of inserts and other internal parts; and even eventually spotting foreign particles in metals and other products.

The laboratory model of the equipment needed for inspecting the powder trains in blasting fuses requires only a small x-ray unit operating at approximately 20,000 volts and 1 milli-ampere, plus a small crystal in a holder, a control box with one or two vacuum tubes, and a relay that can operate a device to call attention to the defective area. In this application, a ¼ in. void in the powder train inside a ¼ in. diameter cord has been detected with the fuse moving at the rate of 60 feet per minute!

The relay could be made to do almost anything automatically — operate a meter, chart a graph, work a rejection lever to remove the product from the line, ring a bell, flash a light, dab red paint on the faulty part, or actually stop an entire production line until the faulty product or process is run down. This type of operation promises to reduce both the operating cost and the manpower required for a given inspection operation.

Although the crystals used to detect small defects are tiny, they may be grown to larger sizes, and batteries of crystals may be arranged so as to integrate a large area. In general, the laboratory models do not use a large "spray" of x-radiation, as do conventional x-ray machines or fluoroscopes, but rather narrow pencil-like beams. In some installations, this may mean that the radiation hazard will be greatly reduced, and the cost of building special concrete or lead partitioning would be either reduced or eliminated entirely.

C-46—Redesigned Fork Truck Device

A redesigned Pul-Pac, fork-truck device, that handles unit loads without use of conventional pallets, is going into production during February, according to announcement by Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich. A pantograph-type linkage actuates the gripper-jaw and pusher rack, in place of the long piston rods employed on previous models, this new construction allowing shorter hydraulic stroke from a more powerful piston, (Turn to page 84, please)

Precision by the ton

CLEARING



An automobile hood is not only a fairly large stamping, but because it is seriously unbalanced in shape from front to back, dies have a tendency to rock as pressure is applied.

The big 4-point, 1500-ton capacity Clearing in this picture, at the Kaiser-Frazer Willow Run plant, is turning out this job in ideal fashion. The multiple suspension, plus the Clearing crankless principle and generous gibbing, keeps the dies true despite severe load unbalance. That means long die life and few production interruptions. If you're interested in the details, we'll be glad to supply them.

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION



A black and white illustration of a man in a trench coat holding an umbrella and a cane, standing in the rain. The text "IS MOISTURE" is written in large, bold, white capital letters across the top right.

YOUR PROBLEM ?



In friction materials,

R/M has the answer!

Moisture, whether caused by condensation or by exposure, has long been a problem in brake operation . . . particularly while the vehicle or machine is still "warming up." But this problem, too, has been conquered by the skill and ingenuity of R/M Engineers. By combining different friction materials, they are able to produce sets of linings that are but little affected by moisture or humidity.

Other operating problems . . . such as extreme temperatures, immersion in oil and grease, uneven wear, rough operation . . . meet their match in R/M materials. Noise and "grab" have been minimized, too, by R/M Engineers. For assistance with any of these problems . . . or if changes in equipment design pose new requirements . . . or if interested in automatic transmission friction materials . . . get in touch now with your R/M representative, or write for R/M Engineering Bulletins. You'll get the help of the world's largest maker of friction materials . . . with four great plants, four research departments, and four testing laboratories.

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION

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1071 Union Commerce Bldg., Cleveland 14, Ohio

Factories: Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C.



NEW PRODUCTS

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(Continued from page 80)

and eliminating severe bending stresses to which the long pistons were subjected. Strong side forces formerly exerted on the long pistons are now ab-

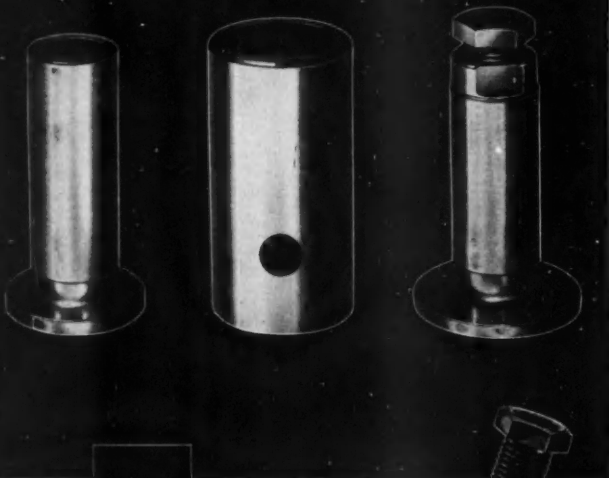
sorbed by the pantograph. Also the new construction eliminates all Pul-Pac structure back of the uprights, which contributes to maximum visibility for the driver.

The new Pul-Pac can operate in less space than former models, with no restrictions on tilt of uprights. The unit has a detachable mounting, and is interchangeable with standard forks up to 54 in. usable length.

The rack and gripper-jaw can be lowered slightly when fully extended to engage and grip carrying sheets flat on the floor. The mechanism is easily disassembled for service.

JOHNSON TAPPETS

assure top grade quality and dependability in your engines. All the plus values of skilled craftsmanship, expert "know-how" and finest materials are automatically yours when you select Johnson Tappets.



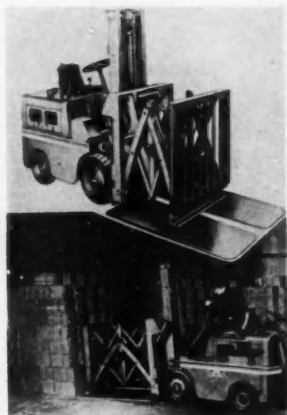
automotive
tractor
industrial

The Johnson Self Locking Tappet Screw has proven most satisfactory in cast iron and steel tappets.

"Tappets Are Our Business"

JOHNSON  PRODUCTS
INC.

MUSKEGON, MICHIGAN



Clark redesigned fork truck Pul-Pac.

C-47—Two-Pen Electronic Recorder

Saving tedious compilation and point-by-point plotting of data, the new 2-pen Speedomax, electronic recorder announced by Leeds & Northrup Co., Phila., Pa., records two functions simultaneously against time. Since both functions are drawn as continuous curves on a 9 1/2 in. wide chart, users can follow swift-changing variables with ease.

Two separate electronically-amplified measuring circuits, two balancing motors, and two recording pens are all housed in one standard Speedomax case. Circuits can be supplied to work with thermocouples, Thermohms, strain gages, tachometers, thermal converters, pH cells, or most other types of primary elements. The instrument can operate controls or alarms.

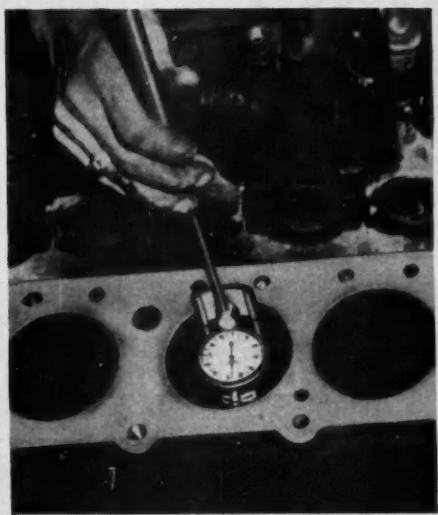
Recording pens operate overlapping or side-by-side, either across full scale or a specified portion of the full width. Speed of response for full-scale pen movement is 3, 2 or 1 second.

(Turn to page 86, please)



Leeds & Northrup 2-pen Speedomax recorder.

**Worried
about the effects
of BLOCK
DISTORTION?**



Let Pedrick help you in this and other piston ring problems!

Block distortion, always a problem in engine design and maintenance, is perhaps more widespread than ever. Why? Repeated increases in compression and running temperatures, for one thing. And for another, there's a growing need for prolonged or uninterrupted operation. Conditions like these are bound to augment any tendencies toward distortion.

Pedrick, working closely with engine designers and operators, has helped solve this problem by providing rings with such lasting conformability that they prevent the blow-by and compression loss that usually appear when distortion begins.

Whatever your problem . . . compensation for distortion, lubrication of top cylinder areas,

prevention of scuffing during break-in . . . you can count on Pedrick's help. With 31 years of concentration in the piston ring field, Pedrick has the specialized know-how to supplement your own experience. Address your inquiry to WILKENING MANUFACTURING Co., Philadelphia 42, Pa. In Canada: Wilkening Manufacturing Co. (Canada) Ltd., Toronto.

Pedrick[®]

"HEAT-SHAPED"

PISTON RINGS

FOR 31 YEARS, SUPPLIER OF PISTON RINGS TO
LEADING VEHICLE AND ENGINE MANUFACTURERS

NEW PRODUCTS

For additional information please use coupon on page 54

(Continued from page 84)

Chart speed—the Y or time axis—can be selected in the range of 1 to 1800 in. per hr. To aid in identification, the instrument draws one curve in red ink, the other in black. Index pointers are red and black to correspond.

C-48—High-Stack, Castered Dolly Racks

Large-castered dolly racks that conserve shipping dock space, designed by Equipment Mfg. Inc., Detroit, Mich., are of stacking type, for warehouse order picking, assembly and storage. Conveniently pushed by hand in assembling individual orders, then towed in trains to loading area, the racks can be stack-



ed to conserve floor space till carrier is ready to receive the shipment. Safe, self-centering stacking caps shown in close-up view permit stacking the loaded truck the limits of truck reach or ceiling. A new towing hook-up keeps trucking even, in long train.

... For smooth engines
CHICAGO TAPPETS

... For rugged engines
CHICAGO SPECIAL AND STANDARD PARTS

Mechanical Tappets
Hydraulic Tappets
Oil Pump to Distributor Shafts
Rocker Arm Shafts
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Adjusting Screws
Cylinder Head Cap Screws
Main Bearing Cap Screws
Differential Carrier Screws

Cylinder Head Studs
Main Bearing Studs
Wheel Bolts and Studs
Push Rods
Retainers
Connecting Rod Bolts
Automatic Transmission Valves
Hydraulic Cylinder Pistons
Diesel Energy Cells
Remote Control Levers

Special Screw Machine Parts 1/16" to 5" Diameter, Plain or hardened and ground • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products •

**The CHICAGO
SCREW COMPANY**
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

C-49—Automotive Electric Fuel Pump

The Bendix Aviation Corp., Eclipse Machine Division, Elmira, N. Y., announces the new Bendix automotive electric fuel pump, now in production for the military services supplying fuel to coolant heaters and space heaters, as well as supplying fuel to carburetors.

Although designed principally for automotive use, the pump's compact design and performance characteristics adapt it to other fuel transfer requirements, such as light aircraft carburetion or aircraft fuel injection systems. It also has wide possible adaptability for the marine and diesel fields.



Bendix automotive electric fuel pump.

A single pump delivers up to 30 gallons per hr. Static pressures up to 7.0 psi are obtainable. For larger requirements two or more pumps are manifolded in series or parallel. Extreme simplicity of design, a unique inter-



SPARKLING
ALCOA FOIL
keeps it dry

When it's needed, this military replacement motor will be ready. Alcoa Aluminum Foil, laminated to other materials, keeps it dirt and moisture free, *ready at the drop of a hat.*

Today, shipment and exposed storage of defense equipment emphasize the remarkable, protective qualities of this sparkling, pure aluminum wrapping . . . qualities already familiar to many industries whose peacetime uses of Alcoa Foil have placed it high on the list of preferred packaging materials.

If you have a packaging problem, consider the many advantages and possible applications of Alcoa Foil. While it is true that current supplies are limited by military needs, we will gladly send you the names of packaging experts, qualified to give you information on material availabilities, as well as capable assistance in your future planning.

Write to: ALUMINUM COMPANY OF AMERICA, 1765 B Gulf Building, Pittsburgh 19, Pennsylvania.



DIESEL LOCOMOTIVES • HEAVY DUTY TRUCKS • CRAWLER TRACTORS • BUSES • ENGINES
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 MARINE ENGINE EQUIPMENT
 AGRICULTURAL POWER SWEEPERS
 RAILWAY AIR-CONDITIONING EQUIPMENT
 OUTBOARD MOTORS
 BUSES
 FIELD AND OIL
 AVIATION

**For America's
Finest!**

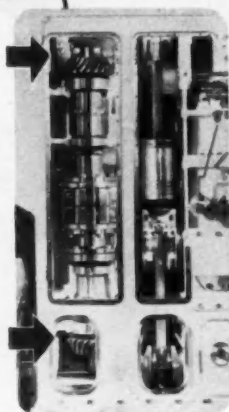
Gears by FAIRFIELD

TWO sets of spiral bevel gears produced by Fairfield interconnect the dual crankshafts of the opposed piston diesel engines in the locomotive shown above, which is one of an ever-increasing fleet serving America's railroads. Diesel locomotives are just one of the many types of equipment that have benefited from Fairfield's pioneering work in producing high precision, automotive type gears to meet virtually any required specification of industry. If gears are a part of the product you make, get acquainted with Fairfield. Write today.

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 HYPOID • HERRINGBONE
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 WORMS AND WORM GEARS

FAIRFIELD MANUFACTURING CO.
 319 SO. EARL AVENUE
 LAFAYETTE, INDIANA



The gear sets used in interconnecting the crankshafts of opposed piston diesel engine are indicated by arrows above.



Ask for a copy of bulletin describing Fairfield facilities.

NEW PRODUCTS

For additional information please
use coupon on page 54

rupter system, and hermetic sealing of all electrical components contribute to unusually long life and durability.

The pump is powered by a solenoid. Pumping is achieved by the movement of a hollow plunger controlled by an interrupter in the electrical circuit; neither a syphon or rubber diaphragm are used. This permits a smooth, steady output of fuel at all temperatures. Successful tests have been conducted at —75 F. As a result, the pump is now being used on military vehicles operating in the Arctic.

Numerous tests are said to have recently indicated that extreme low temperature starting ability of engines is limited by slow cycling of mechanical fuel pumps. The full fuel supply of the Bendix electric pump under similar conditions permits starting at appreciably lower temperatures.

Low power requirement is a feature—only 7 watts being required at maximum fuel delivery.

Performance characteristics claimed for the new pump are: elimination of pressure buildup between fuel pump and carburetor, overcoming hot weather starting difficulties; elimination of vapor lock when employed as a pusher type fuel pump; lower initial cost, and light weight, the pump weighing only 1 lb., 13 oz.

Pumps now in production are for operation on 6, 12, and 24 volts dc with a 110 volt, ac version under development.

A special radar and radio suppressed model is available for military use.

C-50—Unbreakable Non-Glass Mirror

Making its debut on the market is an unbreakable non-glass mirror launched by Flexmir Products, Inc., Newark, N. J., whose reflectability is claimed to be on a par with that of glass. The mirror can be molded for quantity production, cut into circles, squares, arcs and beveled forms, and it is available in silver, gold, and other colors. Produced from Plexiglass made by Rohm & Haas, Lucite, a DuPont product, and a third material which when processed creates a surface less susceptible to abrasion or scratching, and said to rule out distortions, the sheets of the mirror gauge from 0.060 to 0.50 and can be made up to one in. thick.

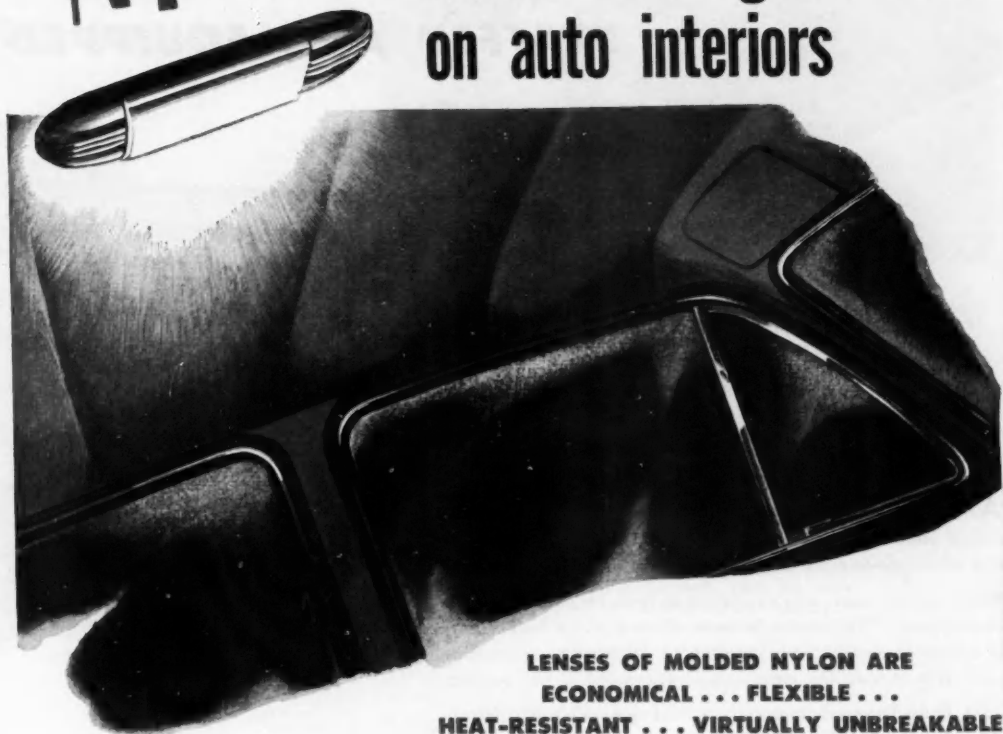
Characteristics claimed for the unbreakable non-glass Flexmir mirror are light weight—1/3 the weight of glass, non-steaming or clouding in frost, and non-distorting at 160 F or —40 F.

(Turn to page 92, please)

NYLON

PLASTIC

sheds new light on auto interiors



**LENSES OF MOLDED NYLON ARE
ECONOMICAL . . . FLEXIBLE . . .
HEAT-RESISTANT . . . VIRTUALLY UNBREAKABLE**

A number of new automobile models are using nylon lenses for overhead interior lamps. This application makes good use of many of the outstanding characteristics that have won nylon plastic such high praise among parts manufacturers.

Nylon's toughness and its ability to be molded in very thin sections mean that lenses of nylon only 0.025 inch thick can withstand rough treatment in both assembly and service. Their flexibility permits them to be snapped in place easily . . . without use of gaskets required for lenses made of more rigid materials. Reduced breakage during assembly . . . the fact that only thin sections of nylon are necessary . . . simplified installation . . . all add up to substantial savings in production costs. And,

extremely important for this application, nylon withstands heat from the lamp and will not yellow with age.

There are many other uses for nylon plastic in the automotive industry—bearings, gaskets, electrical parts, valve seats, gears. Among the unusual properties that make nylon plastic particularly suitable for these applications is its resistance to chemicals, abrasion, fatigue and permanent distortion. Nylon is quiet—permits close mating without chatter, and has good bearing characteristics.

Demand for nylon currently exceeds supply. However, we suggest you evaluate its versatile properties for future application. We will gladly discuss the availability of experimental quantities for development work. For additional information on nylon

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7 S. Dearborn St., Chicago 3, Ill.
845 E. 60 St., Los Angeles 1, Calif.



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While in some cases today's emphasis on brakes is a relatively new development, TDA Brake Division offers nearly a half-century of mature experience in brake research, engineering and testing applicable to virtually every conceivable problem and product.

TDA Brake Division's highly specialized staff and fully equipped plant are completely set up to solve *your* specific braking problem—from the smallest machine to the largest crane or winch. TDA Brakes combine such outstanding features as positive stopping ability, faster, smoother operation, and reduced maintenance. Contact TDA Brake Division today! Or, if you prefer, write for more detailed information.

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Centrifuges • Compressors • Conveyers • Cranes • Cream separators • Diesel hook-ups • Dry cleaning machinery
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• Farm equipment • Earth moving equipment • Construction equipment • Public transportation

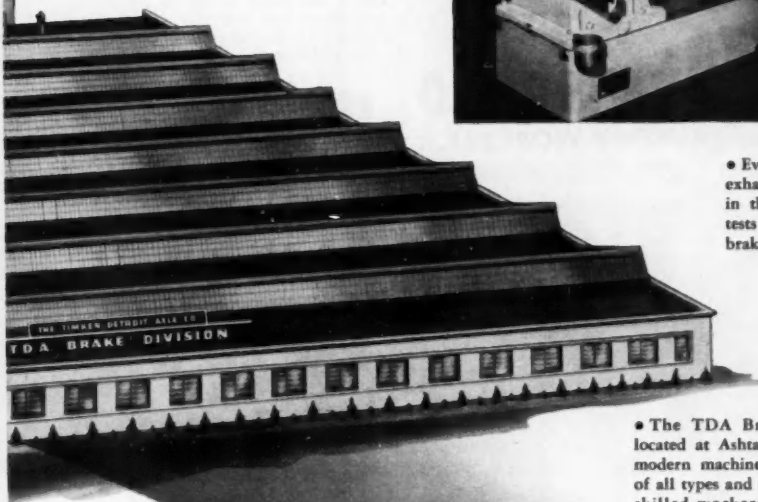
IF ONE OF THEM IS YOURS, IT WILL PAY YOU TO

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**THIS MODERN
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TO SOLVE IT !**



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TDA BRAKE DIVISION

Ashtabula, Ohio

The Timken-Detroit Axle Company



NEW PRODUCTS

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(Continued from page 88)

C-51—Friction Clutch And Brake Unit

For the driving of medium and heavy machinery, a new combination friction

clutch and brake unit, air powered, developed by Power Presses, Inc., Cleveland, Ohio, provides accessibility as the primary feature. Shoe and lining assemblies can be changed in minutes rather than hours, it is declared, without removing the unit from the machine, and all other wearing parts—driving mechanism, pistons, piston packings, springs—may be removed while the clutch is mounted on the machine, without special tools and without removal of other parts.

Disk scoring is declared eliminated because rivet heads cannot come in contact with the disks. Disks are securely bolted into place, instead of floating in

teeth or splines. The basic actuating mechanism is so designed that linings are positively and automatically withdrawn from contact with disks, eliminating drag. It is impossible for brake and clutch to be engaged simultaneously. Oversize bearings reduce bearing pressure per sq in.

One-piece safety construction, with brake operated by pre-loaded springs, assures positive and immediate stop if air-supply or electric-current fails. The entire unit is controlled by a solenoid valve which admits compressed air to the clutch, engaging it. In event of current- or air-failure, this valve, equipped with a spring return, immediately closes, permitting compressed air in the clutch to escape to the atmosphere and causing the brake springs to disengage the clutch and engage the brake.

AIR-LIFT LIGHTENS LOAD for LAUNDRY WORKERS...

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Air Cylinder Reduces Fatigue, Speeds Production, Cuts Costs!

By proper application of a NOPAK Model E Air Cylinder, the National Marking Machine Co. has made its Damp Net Lift a real labor-saving device. It makes the former heavy task of handling damp bundles light, quick and simple; does away with "back-breaking" labor, speeds up work, reduces shakeout costs.

The proper application of NOPAK Valves and Cylinders can improve the performance of equipment that you build or use... for production, maintenance, or material handling.

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2774 S. 31st St., Milwaukee 46, Wis.

Write for Bulletin SW-1 or refer to Sweet's File for Product Designers.

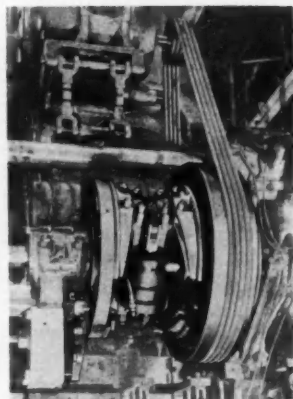
Representatives in Principal Cities

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

A 5873-1/21-A



National Damp-Net Lift powered by NOPAK Model "E" Air Cylinder.



Clutch-and-brake unit of Power Presses Inc., shown in driving position on multiple-station, progressive-die, automatic-feed press, used for blanking, forming and trimming in plant of leading automobile manufacturer.

The unit can be used on presses of all kinds, wire drawing equipment, slitters, marine drives, oil rigs and oil, rubber and rolling mills. It is available also in single clutch and single brake units.

C-52—Non-Cutting Heavy Metal

Hevimet—a non-cutting metal even heavier than cemented carbide and with 50 per cent greater density than lead—is now being manufactured in Detroit by Carboly Company, Inc. Important uses of this special metal, aside from its ability to resist the penetration of radioactive rays, are for balance weights on crankshafts, gyroscopes, variable-pitch propellers, centrifugal clutches and other similar moving parts. For static and dynamic balancing of such parts as well as for balancing of air- (Turn to page 95, please)

M=TC



Fifteen Thousand times a day

MORSE means Timing Chain Leadership

to Automotive Engineers

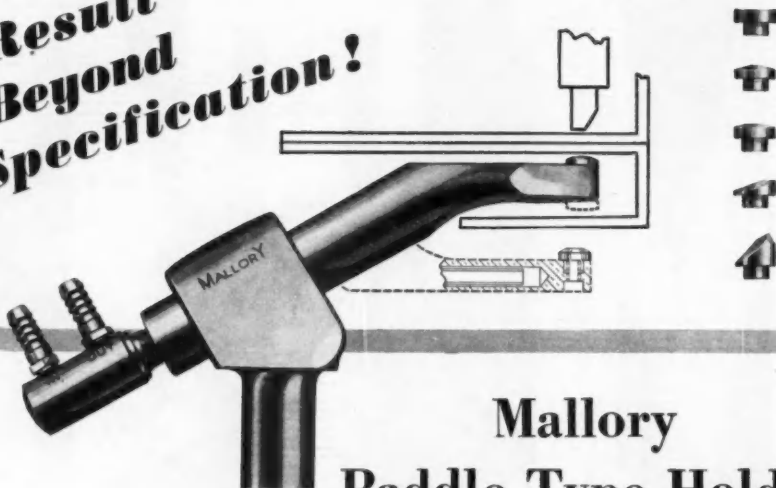
Today, Morse produces timing chains at the rate of 15,000 a day, 4,000,000 a year. In the past thirty-six years, Morse produced 49,000,000 timing chains for original equipment on passenger-car and truck engines.

There is but one automotive timing chain leader. MORSE!



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**Result
Beyond
Specification!**



Mallory Paddle Type Holder

Speeds Welding In Limited Spaces

MALLORY HOLDERS

Mallory Holders are designed in a wide range of sizes and types, available in three groups—light—standard—and heavy duty—to cover a wide range of operating pressures. Each type of Mallory holder is designed for a specific type of work and a variety of sizes are carried in each type. The full range of Mallory holders allows quick changeovers in your shop and eliminates the need for expensive specials.

Typical of the time- and money-saving results of Mallory research and development in the resistance welding field is the Mallory Paddle Type Holder.

Water cooled and easily adjustable in amount of offset, it features replaceable tips that can be used on either face of the rotatable barrel. Its heavy duty construction enables it to be used on high pressure, hard-to-reach spots. Utilizing a wide range of standard button-type tips, the Mallory Paddle Type Holder requires a minimum clearance of only $\frac{3}{16}$ " . . . speeds up operations in a great variety of once-difficult jobs . . . lowers production costs.

That's result beyond specification!

Mallory resistance welding know-how is at your disposal. What Mallory has done for others can be done for you!

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings

P. R. MALLORY & CO., Inc.
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NEW PRODUCTS

For additional information please use coupon on page 54

(Continued from page 92)

craft control surfaces, etc., it has the advantage of maximum weight with minimum size.

As a high density material it is of important use for gamma ray screens as used in radiotherapy and other similar applications.

Sales of Hevimet as well as of Carboly permanent magnets (Alnico and other types) are also being handled by the Carboly company.

C-53—High-Tiering Fork Lift Truck

A "Tier-Master" fork lift truck with telescoping uprights low enough to



Mobilift "Tier-Master" fork lift truck.

enter a motor truck van body, yet with a lift that will tier merchandise and materials three pallets high, is in production by Mobilift Corp., Portland, Ore. The new model is only 72 in. high with the mast lowered but will lift 117 in. from floor-to-forks, the overall height of the extended mast being 142 in. The Mobilift roller chain lift mechanism allows unobstructed visibility between the uprights and lifts at a speed of more than 45 fpm.

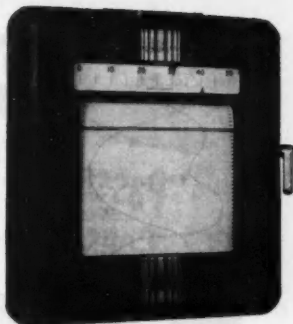
Like all Mobilift models, the new "Tier-Master" has Lev-R-Matic drive controls which allows forward or back operation at the push or pull of a single lever without shifting gears. All three control levers are conveniently grouped for finger-tip, right hand operation. The "Tier-Master" is a stand-up type, 2000-lb capacity Fork lift truck with an out-

side turning radius of 57 in. and a zero inside turning radius. The new model is powered by a 3 cyl air-cooled, gas operated Mobilift engine.

C-54—Motor Starter For Machines

Protection of operating personnel as well as the connected machine is stressed in a new motor starter—the Motor Watchman, Class 10-100-S1—available from Westinghouse Electric Corp., Pittsburgh, Pa.

With ratings up to 600-v, 7½ hp polyphase, 5 hp single phase; or 220-v, 1½ hp dc, it starts, stops, and provides



Westinghouse motor starter, the Motor Watchman, class 10-100-S1.

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Passenger Comfort
Goes Up ...

Maintenance
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with **LORD
MOUNTINGS**

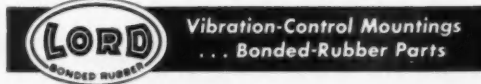


When you specify LORD Mountings you are purchasing protection. They protect passengers from noise and vibration ... make their journeys more pleasant, more comfortable ... induce them to travel by bus again.

LORD Mountings also protect bus and equipment from road shock and vibration—resulting in smoother and more dependable operation, at lower maintenance cost. Here are some of the places where LORD Mountings will serve you profitably.

- Engine Mounts
- Radiator Mounts
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LORD MANUFACTURING COMPANY • ERIE, PA.
Canadian Representative: Railway & Power Engineering Corp. Ltd.



NEW PRODUCTS

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use coupon on page 54

overload protection for single phase, polyphase and dc motors.

The self-indicating handle, interlocked cover that prevents opening unless starter is "off," and safety latch to lock starter "off" during servicing are personnel-protection features.

Positive motor-protection is provided by the quick-make, quick-break, over-center toggle mechanism—De-ion arc-quenching — and bimetallic disk-type thermal overload relay.

Straight-through wiring facilitates installation and servicing, and Bonderized enclosures prevent blistering, flaking and corroding.

C-55—Puncture-Proof Tubeless Tire

Tested by Wilmer Shaw at the Indianapolis Speedway, a new tire that is blowout-safe, puncture proof and tubeless—produced by the Firestone Tire & Rubber Co., Akron, Ohio—is so constructed that in event of blowout it retains the great bulk of its air pressure in an inner diaphragm, giving it sufficient support to make the car easily controllable at all speeds.

If, on the other hand, a puncture occurs, no air is lost because soft, pliable rubber within the tire surrounds the cause of the puncture to prevent air leakage. Then when cause of the puncture is removed, this soft rubber seals the hole, which requires no repairs.

C-56—Hat for Safety Plus Appearance



Becoming to any woman who wears it, yet primarily designed for safety, a hat for "Mi-Lady" in industry, introduced by the Safety Division of the Beyer-Campbell Co., Detroit, Mich., is known as "Ray-ve." Made of a washable blue taffeta, cool and featherweight, it is designed to avoid scalp perspiration which tends to oily hair and itchiness. "Ray-ve's" construction is said to afford no inclination to tuft the hair in front, a hazardous practice with a peak-cap, which is ordinarily worn on the back of the head. The need of the "Ray-ve" hat is adjustable to take care of any amount of hair, the company declares, and once adjusted to the individual, requires no further attention.

(Turn to page 132) please)

"Let's keep this just as quiet as we can!"



EXTREME QUIETNESS is one of the
6* outstanding advantages of
"COMPO" and **"POWDIRON"** BEARINGS AND PARTS

Constantly maintained oil film ends noisy metal-to-metal contact. Accurate dimensioning keeps parts working together smoothly and silently. These are the "let's keep it quiet" features of "COMPO" and "POWDIRON" bearings and parts—put them to work in your product!

For the latest line-up of stock sizes of "COMPO" bearings, write on your company letterhead. Consult our Engineering Department on special requirements for bearings or parts.

Send for this **FREE** Booklet

**"THE 6 OUTSTANDING
ADVANTAGES OF
"COMPO" and
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1. Extreme quietness
2. Efficient self-lubrication
3. Low installation cost
4. Low operating and maintenance cost
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6. Low unit cost



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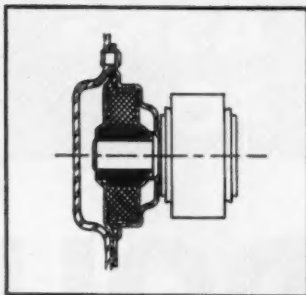
**Powder Metallurgy Parts
Result in Quiet Operation**

Manufacturers of household appliances, business machines and factory equipment have long recognized the importance of quiet operation as a selling tool. Product designers have found economical ways of obtaining this desirable feature through increased use of bearings, gears, cams and other parts produced by powder metallurgy.

These bearings and parts, manufactured under the trade name of "COMPO" (porous bronze) and "POWDIRON" (sintered iron), assure extremely quiet operation because of (1) their accurate dimensions; (2) their method of lubrication.

Accurate Dimensions

"COMPO" and "POWDIRON" bearings and parts are die-formed to their final dimensions within extremely close tolerances. Hence the play of shafts in bearings can be kept to a minimum; gear, cams and similar parts mesh closely and quietly. These advantages are obtained without any need for expensive machining operations to give the required tolerances.



In this application of a self-aligning "COMPO" bearing in an electric fan, accurate dimensioning permits extremely close running clearances, essential for quiet operation.

Method of Lubrication

The lubrication principle used in "COMPO" and "POWDIRON" eliminates any noise-producing metal-to-metal contact between moving parts. When the machine is at rest, oil is stored uniformly throughout the capillary structure of the bearing or part. When the machine starts, oil is instantly fed to the surface from the microscopic pores, thus maintaining a constant oil film.

Recommendations on "COMPO" and "POWDIRON" bearings and parts for specific applications may be obtained from the manufacturer, Bound Brook Oil-Less Bearing Company, Bound Brook, N. J.

Aluminum Cylinders Without Liners

(Continued from page 33)

Cylinder bores of these engines ranged from a little more than one in. to over five in. The number of engines with chromium-plated aluminum cylinders in service increases month by month, and the second million road kilometers will be covered in much less time than the first was.

Mr. Mahle states that although general conclusions ordinarily must not be based on limited experimental results, the many favorable results which have been obtained to date leave no room

for doubt that after further intensive development work complete success will be achieved. A problem of this kind cannot be solved on paper, but must be investigated from every angle in collaboration with interested engine experts. The objects that are attainable through this development may be summarized as follows (Figs. 1 and 2):

First of all, a higher compression ratio may be used, because aluminum has a heat conductivity three times as great as that of cast iron. With this

higher compression ratio it is possible to increase engine output by at least 10 per cent, without a general redesign. In a new design it should be possible to increase the proportional gain even more.

Owing to the decrease in cylinder temperatures there should be nothing in the way of an increase in engine rpm, and of a consequent further gain in output.

The increase in output would be accompanied by a decrease in the specific fuel consumption, which also should be at least 10 per cent. With an increase in the compression ratio the thermal efficiency—and, therefore, the fuel utilization—increases automatically; peak temperatures of the cylinder head, exhaust valve, and spark-plug seat decrease, and the entire engine operates more efficiently.

In a test with Mr. Mahle's own car, which was still continuing after 31,000 miles, it was possible to drive 3100 miles at a stretch without checking the oil level. At the end of the 3100 miles the oil consumption was found to have been only 1.55 lb, and this oil economy continued during successive periods of the test. This in itself is indicative of the excellent cooling, the good bearing conditions, and the favorable influence of the small piston clearance made possible when piston and cylinder are made of similar materials.

A further advantage is the saving in weight, which under certain conditions can be quite important. In water-cooled engines it is of importance that the parts of the cylinder in contact with the coolant are non-corrodible, and in aircooled engines there is a lesser temperature difference between the upper and lower end of the cylinder on the one hand, and between the cooled and uncooled side on the other.

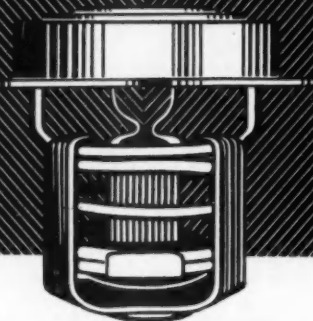
Of special significance to the piston manufacturer is the small piston clearance, both at the top land and at the skirt, which results from the practically ideal expansion relationship between an aluminum cylinder and an aluminum piston. This will invalidate the rules for piston design which have been in use for many years, and open up new possibilities.

Some of the technical problems connected with the chromium-plating process and the use of chromium-plated aluminum cylinders are discussed by Mr. Mahle as follows:

How can it be explained that chromium, in spite of its low heat expansion, bonds excellently with the aluminum? That it does this is beyond doubt. The chromium case evidently enters into an atomic combination with the aluminum base. After numerous heatings and coolings minute cracks form in the relatively thin chromium layer, and permit of the needed equalization. This shows that, rather than

The Trend to
Sealed Cooling
Systems

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DOLE "DV" THERMOSTATS

More than eleven years of gradual modernization in automotive cooling systems calls for an answer in the design of automotive thermostats.

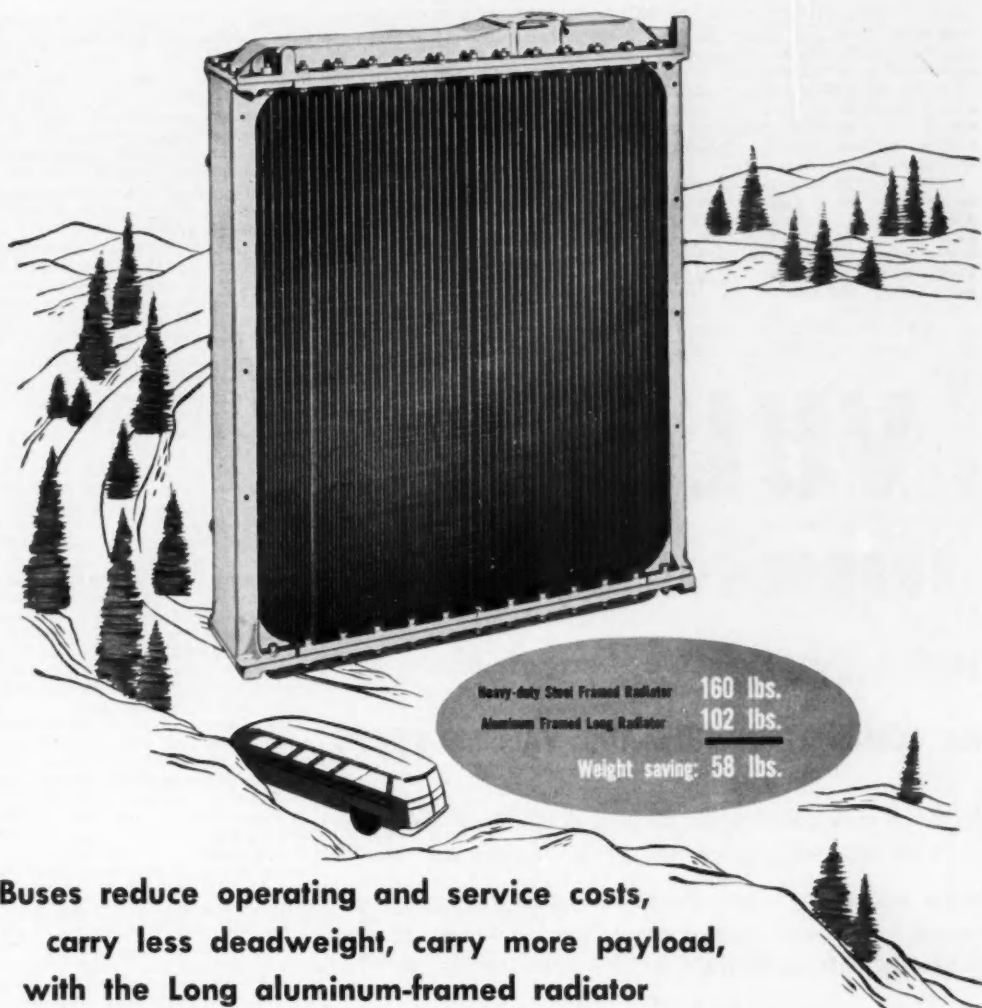
Dole gave the industry that answer in the Dole "DV," a thermostat completely new in principle and performance. It assures all the advantages of motor temperature control on old type cooling systems, but . . .

Significantly it is the "DV" that delivers those advantages also on the smaller radiators with high pump pressure of the modern sealed system—consistently and continuously.

CONTROL WITH DOLE

THE DOLE VALVE COMPANY

1901-1941 Carroll Avenue, Chicago 12, Illinois
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**Buses reduce operating and service costs,
 carry less deadweight, carry more payload,
 with the Long aluminum-framed radiator**

This entire radiator frame—upper and lower tanks and the sides—is made of aluminum, cutting weight over 36%. It is easier to service. It involves no change elsewhere in the cooling system and it stands up under heavy-duty bus operating conditions. Since 1903 we have been specialists in the design and production of balanced cooling systems for internal combustion engines.



**LONG MANUFACTURING DIVISION
 BORG-WARNER CORPORATION**



**DETROIT 12, and
 WINDSOR, ONT.**

separating from the aluminum, the chromium layer ruptures. Practice has shown that these fine cracks or fissures have no deleterious effect, and are rather beneficial in that they enable the oil film to get a better hold on the bearing surface, thereby improving lubricating conditions.

How is the chromium-plating process carried out? This is a galvanic plating process, similar to processes which have been in use for a long time, but is carried out with all of the lesser improvements and tricks which are learned only gradually through intensive development. It has been found that the machining and pretreatment

of the surfaces to be plated are of the same importance as the voltage, the current density, the temperature, and the composition of the plating bath. Efforts are made to plate the liners exactly to the right measurement, so that the final finishing operation in the honing machine can be kept down to a minimum.

For the production of the cylinders all of the various technical processes are available, and the choice can be based on the cylinder design. Engine cylinders and cylinder liners have been made in sand castings, permanent-mold castings, centrifugal castings, and as forgings. Where large production is

contemplated the die-casting process can be used.

In the case of heavy-duty cylinders the forging process may be regarded as a reserve, to be resorted to in case the conventional casting processes yield a material that does not show as high mechanical properties desired.

Already numerous data are available with respect to the design of cooling fins for air-cooled engines, and also with regard to cylinder temperatures. It has been shown conclusively that, even with the increased compression ratios, temperatures in top dead center are about 20 per cent lower with aluminum than with gray-iron cylinders.

As material for the cylinders the whole gamut of aluminum alloys is available, including the conventional silicon-aluminum piston alloys and the group of copper-aluminum alloys such as the Y alloy, RR 53, Hydronalium and Duralumin. Both groups have their advantages and disadvantages, and there is no need to choose between them definitely at the start. The copper-aluminum group will always have the advantage that when it is used in the cylinder and the piston is made of a silicon-aluminum alloy, the smaller expansion coefficient of the latter can be made to compensate for the somewhat higher piston temperature as compared with that of the cylinder. In this way clearance conditions can be created which never before have been possible in the entire history of engine development. Even in the very first experiments a reduction of the skirt clearance to 25 per cent of the previously conventional value proved practical, and clearances on the top land and over the ring belt were similarly reduced. This paves the way to certain developments in piston design which should react favorably not only on the pistons but on the engine as a whole.

The following (apparently very conservative) example of the saving in engine weight is given in the article: An engine with air-cooled cast-iron cylinders weighed 198 lb and developed 24 hp, which made the specific weight 8.25 lb per hp. With chromium-plated aluminum cylinders the same engine weighed 190 lb and developed 26.5 hp, thus making the specific weight 7.2 lb per hp, an improvement of more than 10 per cent.

While in the foregoing the emphasis has been mainly on air-cooled cylinders, important advantages are possible also with water-cooled cylinders. However, to fully realize these it will be necessary to overhaul designs. Jacket spaces should be reduced and the radiator made smaller.

The life of the cylinder bore depends on the method of chromium plating. A distinction is made between smooth and porous chrome plate. The porous-plated surface is roughened either galvanically or chemically, or mechanically by "milling." This improves the adhesion of the oil film to the bearing surface. "Milled" surfaces have the

VULCAN

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is the Perfect Diaphragm Material
for COMBINATION FUEL AND VACUUM PUMPS

More and more manufacturers are now making these combination units, and more and more are using VULCAN diaphragm material.

When you specify Vulcan Coated Fabrics for fuel pumps and vacuum booster pumps, you get material that is TWO WAYS right in meeting your requirements.

The same material that has such excellent resistance to aromatic gasoline also provides the high tensile and burst strength necessary to operate the vacuum booster pump.

Wherever diaphragms are used in automotive parts, VULCAN offers the right kind of diaphragm fabric for the job. Write for literature.

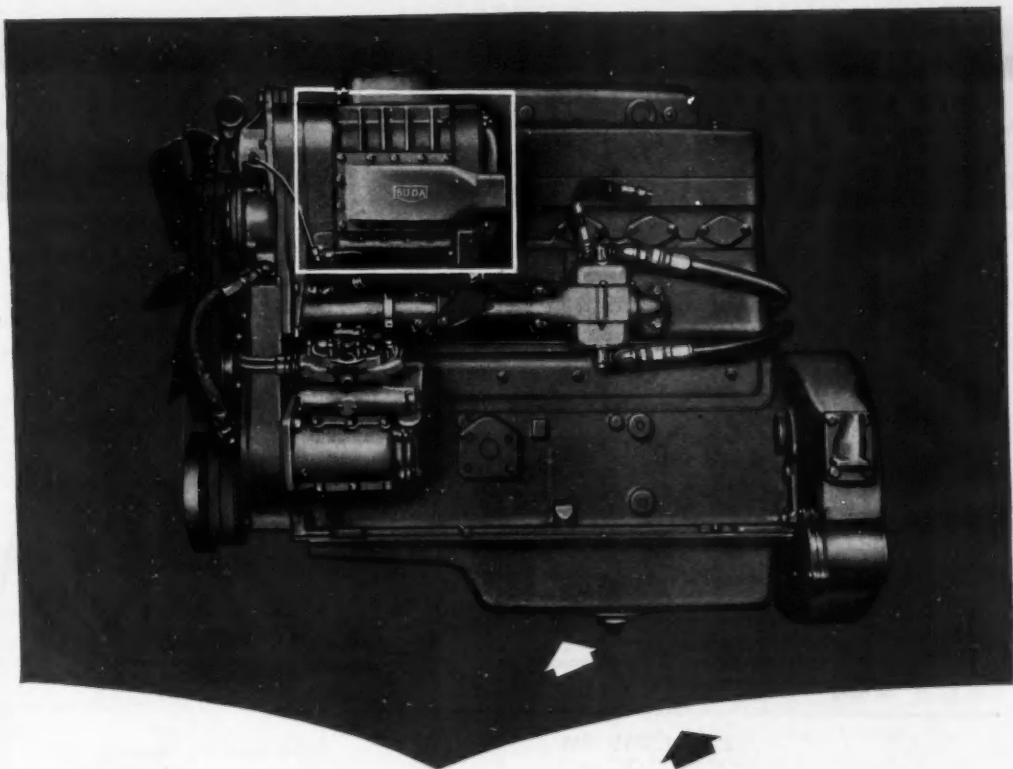


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built in for added horsepower and economy

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For motor truck, marine, railway or general industrial applications, supercharging means savings in engine space and weight . . . means power to pull heavy loads . . . means sea-level operation at high altitudes. All these extra benefits without corresponding increases in operating costs.

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LOW COST?
I'LL SAY!
MOST SIZES COST
LESS THAN
HIGH-SPEED
STEEL TOOLS



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REALLY FAST
LOCAL DELIVERY...
STOCKS IN
95 CITIES



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CEMENTED CARBIDE

STANDARD TOOLS

for **M**aximum **P**roductivity

plus ADAPTABILITY...UNIVERSAL USE
LOW COST...GREATER AVAILABILITY

CARBOLOY "Triple C" PLAN

*delivers maximum
productivity with carbides!*

You can get even greater productivity out of carbide tools with the Carboloy "Triple C" Plan of Co-ordinated Carbide Control. The CCC Plan Book explains in detail just how this plan works and how you can use it in your own plant.

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GT 216-A



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- Maximum production per machine
- Maximum machine speeds
- Maximum adherence to tolerances
- Maximum tool life
- Maximum pieces per tool
- Minimum number of rejects

... advantages that add up to maximum
productivity — plant wide

Carboloy Standard Tools can be adapted to do up to 80% of your single-point tool machining! They can be used to machine any metal or non-metallic material and deliver unmatched performance on steel cutting. And Carboloy Standard Tools are comparable in price to many high-speed steel tools, and in many sizes are actually cheaper.

Write today for price list and new Catalog GT 250.

CARBOLOY COMPANY, INC.

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THE QUALITY BRAND OF
STANDARD TOOLS

"The least number of tools for the greatest number of jobs"

"Excellent and Profitable"

reports Liberty Steel Chest Corporation on



Cincinnati

Cleaning Machine Features



Cincinnati monorail cabinet type wash, rinse, dry installation at Liberty Steel Chest Corp.

On each Cincinnati Cleaning or Finishing Machine installation Cincinnati engineers find that specific Cincinnati engineered features rate unusually high with the user. It's not always the same features . . . in fact it rarely is. But always, after some months operation, the user reports that certain advantages of his Cincinnati equipment are unusually well adapted to his particular problem.

The reason? Simply this: every Cincinnati installation is carefully engineered to the requirements of the user by an engineering staff which has grown up with the cleaning and finishing machine industry.

That's the reason this Liberty Steel Chest Corp. installation gets its "excellent and profitable" rating on such features as removable steam coils, tank flushing pipes and centralized controls. It's the same reason you'll find Cincinnati a solution to your cleaning or finishing problem "excellent and profitable".

New catalog of cleaning and finishing machines now available. Write for your copy.

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Other installations include:

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Kaiser-Frazer Corp.
Lincoln Mercury Division,
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Plymouth Motor Corp.
Pontiac Motor Division,
G. M. C.
Wm. Powell Co.
Remington Rand, Inc.
Standard Steel Spring Co.
Ternstedt Division, G.M.C.

advantage that very small dirt particles, which might cause trouble by reason of the very close fits, are better taken care of by the cylinder.

The following figures, relating to the advantages gained by substituting chromium-plated aluminum for cast iron in the cylinders of small two-stroke engines, were furnished Mr. Mahle by the American manufacturer Mall: The compression ratio was increased from 5 to 6. Power absorbed by the cooling blower was reduced from 1.0 to 0.5 hp. Piston-skirt clearance was reduced from 0.0067 to 0.0016 in. The weight of the cylinder was reduced from 16.5 to 5.5 lb, and the output was increased from 4 to 7 hp by increasing the compression and by speeding up the engine from 4000 to 4500 rpm.

Stepped Diameter Parts Extruded

(Continued from page 50)

1½ in. in diameter and 14 in. long. Although the permissible tolerance on most diameters is specified as 0.010 in., careful maintenance of cemented-carbide dies is effective in holding diameters to a tolerance of around 0.001 to 0.002 in.

Starting with the rough commercial bar, in heat treated condition, the shaft is produced in a progression of three stations in the press. Close control of dimensional tolerances, it may be noted, is a must in this technique since major variations would make it impossible to hold lengthwise dimensions within desired limits.

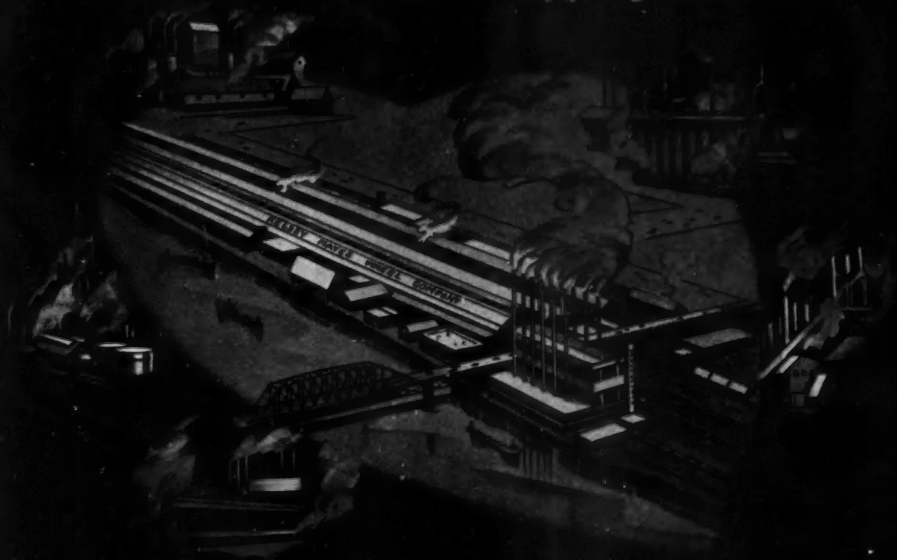
It is of interest that before starting the extrusion cycle, the bars or slugs are given a special chemical surface treatment in a heated bath which produces a strong crystalline deposit of zinc phosphate in a soap base. The result is a dark shiny coating which serves as a drawing compound sufficiently adherent to remain on the extruded part after the operation has been completed.

An automotive stud, illustrated here, is typical of parts which can be produced without machining of any kind, save for rolling the thread and serrations. This part is made from a small slug, extruded to produce the stepped diameters and long enough to leave stock for heading. In this case the stepped diameters are readily held to a tolerance of 0.001 in. so as to hold the thread pitch diameter accurately. The head formation is done in a vertical hydraulic press fitted with tool steel dies.

It may be noted that all formations, tapers, fillets, etc., are produced accurately to specified limits on all parts regardless of size.

KELSEY-HAYES

McKeesport, Pennsylvania Wheel Plant
IN THE WORLD'S STEEL CAPITOL
At the Heart of Main Shipping Routes



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This Eastern Assembly Division is right in the heart of the world's leading steel production area, in the midst of a remarkable system of transportation. Thus, in addition to easily and quickly serving every point in the east, Kelsey-Hayes efficiently delivers throughout the United States by rail and highway . . . and by water.



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PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.
PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

Planetary Transmission

(Continued from page 48)

control valve is closed, the floating valve moves outward to open an outlet which permits oil to escape from the annulus, but the ducts are kept full because weights of parts and spring tensions are such that centrifugal force of the fluid is balanced.

When engine speed is reduced to idling, either clutch is automatically disengaged. This action is controlled

by centrifugal, spring-loaded valves in the clutch unit which open and permit oil to escape at low engine speeds but close when engine speed increases so that oil pressure causes the clutch to engage. When the engine comes to a full stop, a secondary spring moves the plunger inward and closes the exhaust port so that the engine can be started by towing the car.

Pockets, cored in the rear clutch plates, act as air cells to prevent severe clutch engagement at low speeds when centrifugal action of oil in the annulus is not sufficient to cause initial clutch engagement.

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

- SAE Passenger Car Body & Materials Mtg., DetroitMar. 6-8
- International Auto Salon, Geneva, SwitzerlandMar. 8-18
- Amer. Soc. Tool Engrs., New York CityMar. 17
- Western Metal Exposition and Congress, Oakland, Calif.Mar. 19-23
- Pacific Automotive Show, Seattle Mar. 21-24
- Salone Internazionale Dell'Automobile, Turin, ItalyApr. 4-15
- British Automobile and Motor Cycle Show, New York CityApr. 15-23
- Amer. Soc. Lubricating Engrs., Phila.Apr. 16-18
- SAE National Aeronautic and Aircraft Engine Display, Hotel Statler, N.Y.C.Apr. 16-18
- Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic CityApr. 17-20
- 1951 Metal Powder Show and 7th Annual Meeting of Metal Powder Assn., Cleveland, OhioApr. 25-26
- Chamber of Commerce Annual Mtg., Washington, D. C.Apr. 30-May 2
- Materials Handling Conference, ChicagoApr. 30-May 4
- A.E.R.A. Convention, ChicagoMay 7-9
- Nat'l Air Races, Cleveland Airport May 19-20
- Amer. Society for Quality Control, ClevelandMay 23-24
- SAE National Summer Meeting, French Lick, Ind.June 3-8
- Third World Petroleum Congress, The Hague, Scheveningen, HollandMay 28-June 6
- American Gear Manufacturers Assn. (Annual Meeting), Hot Springs, Va.June 4-6
- American Society of Mechanical Engineers semi-annual meeting, Toronto, CanadaJune 11-15
- American Society for Testing Mat'l's Annual Meeting, Atlantic City, N. J.June 18-22
- SAE National West Coast Meeting, Seattle, Wash.Aug. 13-15
- First European Machine Tool Exhibition, ParisSept. 1-10
- SAE Tractor and Production Forum, Milwaukee, Wis.Sept. 10-13
- Sixth National Instrument Conference and Exhibit, Houston, Texas Sept. 10-14
- American Society of Mechanical Engineers (fall meeting) Minneapolis, Minn.Sept. 25-28
- Nat'l Metal Trades Assn., Chicago, Ill.Sept. 26-28



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venience and economy in your selection, purchasing and delivery of all your pyrometer supplies. There's a Honeywell Supplies Man near you ... at your local Honeywell office ... no further away than your phone. Call him today!

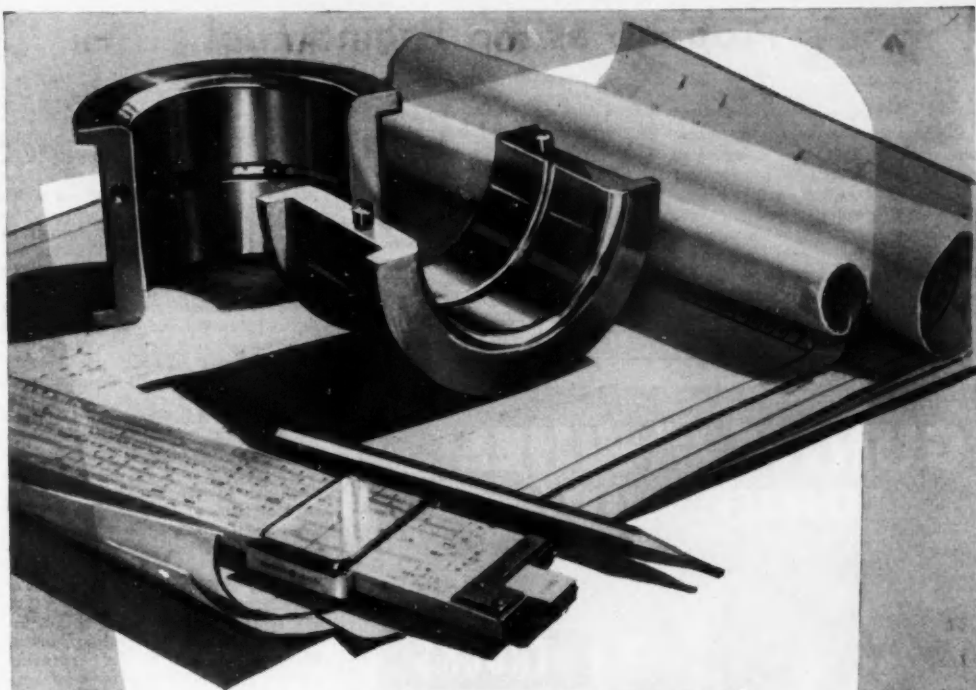
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HSM

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BROWN INSTRUMENTS



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Propane as An Engine Fuel

(Continued from page 45)

In general, there is no minimum limit to the fleet size for economical operation. In fact, there are many small operators using propane powered vehicles because they find them more economical than gasoline or diesel.

It is true that the capital investment for storage and dispensing equipment will assume a greater burden to the small operator. However, there are ways to avoid this. The operator with

only a few vehicles may elect to refuel at the supplier if such is convenient.

Although generalizations are not always applicable to the specific case, it may be of interest to review the probable savings of a medium size operation converted to propane. Table 2 is an analysis of the probable savings in a 50-bus operation. With a differential of \$0.05 per gal in favor of propane the initial investment can be paid off in twelve months.

Cost and Availability

The operator considering converting to propane is interested not only in its present cost, but also in whether the price may be expected to remain stable in the future. As the potential production of LP-gases is enormously in excess of any foreseeable market demand, a long term favorable price structure is to be expected.

Two principal sources of LP-gases are as by-products of natural gas wells and crude oil refining. The spectacular expansion of the natural gas industry following World War II has resulted in an enormous increase in the potential production of LP-gases, which in 1950 was in excess of 16-billion gal, of which 10-billion were propane. In addition to this, there will be one-billion gal produced in refineries. In contrast, the total sales of LP-gases during 1950 were about three-billion gal, thus the untapped potential production is tremendous.

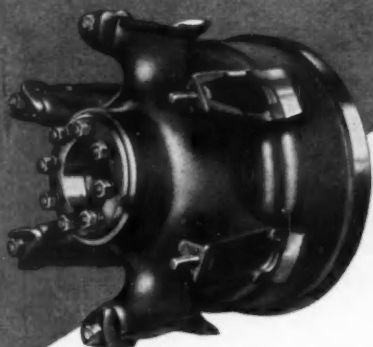
During 1948 there was a temporary scarcity of LPG. This was due not to any scarcity of raw material, but because of a lack of recovery equipment. However, because of the expanding market and the enforcement of conservation laws prohibiting the disposal of these gases by flaring, the last few years has seen a very rapid increase in the installation of recovery equipment.

At the present time, Group III tank car prices for propane are from \$0.025 to \$0.035 per gal compared to from \$0.095 to \$0.10 for gasoline and \$0.075 to \$0.08 for Diesel fuel by similar delivery. Allowing for the somewhat higher cost of handling and storing, propane enjoys a favorable differential of from \$0.05 to \$0.06 over gasoline and \$0.03 to \$0.04 over Diesel fuel. As a motor fuel, propane is taxed the same as gasoline; although Diesel fuel does not carry the \$0.015 Federal excise tax.

Of course, average figures are of little importance to the operator who is concerned with the availability and the price he must pay for the fuel locally. The lack of uniform distribution has restricted the use of propane. However, since the market for propane is increasing, the distribution is becoming more widespread.

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for
HIGHWAY
TRUCKS
TRAILERS

TUBULAR-SPOKE, CAST ELECTRIC-STEEL WHEELS
offer you maximum strength...minimum unsprung weight

More and more automotive engineers are demanding the advantages of GUNITE Wheel Assemblies for trucks and trailers. The GUNITE Wheel offers light-weight design with the proven strength and rigidity of cast electric-steel. The GUNITE Rugged Brake Drum prevents brake troubles, provides more efficient braking and offers lower cost per mile. These two together form the GUNITE Wheel Assembly which is available to fit most standard truck and trailer axles.

WRITE FOR GUNITE WHEEL INFORMATION

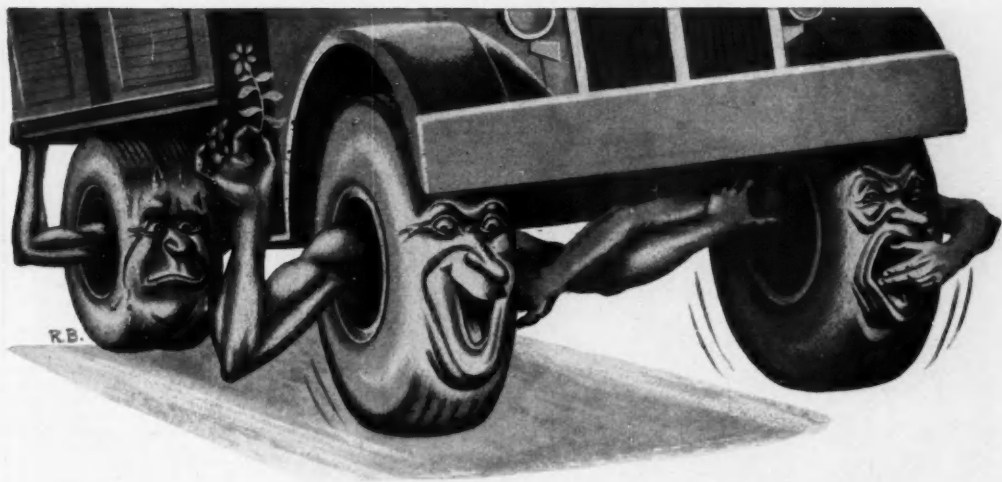
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AUTOMOTIVE
INDUSTRIES
are always
WELL
INFORMED*



Put those **FRONT** axles to work...

Front axles, too, should carry their full share of the load—the share that means extra tonnage . . . extra truck-owner satisfaction.

Saginaw's new hydraulic power steering gear permits truck manufacturers to design vehicles that will carry up to *double* the usual payload on the front wheels—without exceeding legal load limits.

Here, truly, are *big* advantages that truck owners look for. Here is a product which not only adds extra load capacity and brings additional profits per trip . . . but affords greater driving ease and safety as well. Millions of miles of steady performance prove its superiority.

Leading automotive manufacturers have depended upon Saginaw's highly skilled engineering and design staffs—its outstanding, *quality* products, and large scale manufacturing facilities—for more than 38 years.

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The same Ledex standard of dependable remote control and power is available for your product. The vast production applications of Ledex Rotary Solenoids vary from the dependable snap-action operation of aircraft mechanisms to the powerful actuation of rugged hydraulic valves in heavy duty materials handling equipment.

We supply to quantity users and solicit the opportunity to be of assistance in engineering a Ledex Rotary Solenoid to meet the requirements of your product.

Write today for LEDEX ROTARY SOLENOID
BASIC ENGINEERING DATA

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Business in Brief

Written by the Guaranty Trust
Co., New York, Exclusively for
AUTOMOTIVE INDUSTRIES.

General business activity in mid-January continued substantially higher than a year ago, although moderately below levels established in previous weeks. Slight declines were reported in most groups, although crude oil production attained a record peak. For the week ended Jan. 20 the *New York Times* index of activity stands at 179.3 as compared with 179.5 in the preceding week and 160.9 a year ago.

The dollar value of department store sales in the week ended Jan. 20, as reported by the Federal Reserve Board, was equal to 301 per cent of the 1935-39 average, as compared with 305 in the week before. At this level, the value of sales was 31 per cent above that of the comparable week of last year. The total reported since the beginning of 1951 was about 33 per cent more than the corresponding sum in 1950.

Production of bituminous coal and lignite in the week ended Jan. 20 is estimated at 11,175,000 net tons, 645,000 less than output in the week before, but 3,915,000 more than the comparable amount a year earlier.

Civil engineering construction volume reported for the five-day week ended Jan. 25, according to *Engineering News-Record*, was \$305.3 million, as compared with \$391.6 million in the preceding week. The total recorded since the beginning of 1951, at \$1267 million, is 38 per cent more than that in the corresponding period of 1950.

Production of electric power declined more than seasonally during the week ended Jan. 20. At 699 million kilowatt-hours, total output was 14.4 per cent above the amount a year earlier, as compared with a year-to-year advance of 15.8 per cent shown in the preceding week.

Railway freight loadings in the week ended Jan. 20 totaled 779,816 cars, 0.4 per cent less than the figure for the week before but 25.9 per cent more than the corresponding number last year.

The wholesale price index of the Bureau of Labor Statistics for the week ended Jan. 23, at the new record of 179.9 per cent of the 1926 average, was 2.2 per cent higher than the level four weeks ago and 18.9 per cent above the comparable figure for 1950.

Average daily crude oil output in the week ended Jan. 23 reached a new peak of 6,051,350 barrels, 299,840 more than in the preceding week and 4,962,300 above production for the similar period of 1950.

Member-bank reserve balances decreased \$227 million during the week ended Jan. 17. Underlying changes thus reflected include decreases of \$315 million in Reserve-bank credit, \$172 million in money in circulation, \$51 million in the monetary gold stock, and \$54 million in foreign deposits with the Federal Reserve banks. Increases include \$151 million in Treasury deposits with Reserve banks and \$26 million in other deposits with Federal Reserve banks.

Total loans and investments of reporting member banks decreased \$285 million during the week ended Jan. 17. An advance of \$48 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at \$17,972 million, were \$4111 million more than the comparable sum a year earlier.

A LESSON IN SAVING—

*Production
Problem*

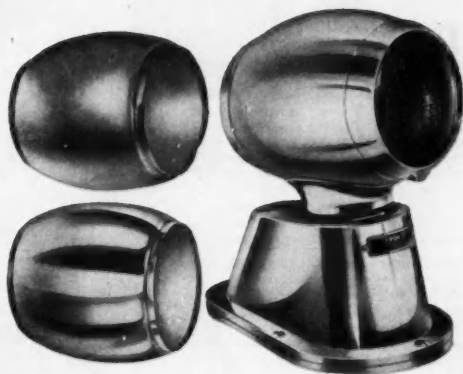
+
**REV-O-LITE
ENGINEERS**
+
REVERE

**ELIMINATION OF COSTLY
FORMING OPERATIONS, BRAZING
AND EXTRA HAND FINISHING,
PLUS FASTER PRODUCTION...
AND AN IMPROVED PRODUCT**

IN the development of their Rev-O-Lite, a revolving warning light for emergency vehicles, the Balford Corporation, Jacksonville, Florida, found themselves faced with a production problem regarding the cylindrical shell which contains the lights. The question was; what would be the most efficient and economical way to produce this shell that measures 6" in length and is 4½" in diameter at the ends? Should it be formed from a metal strip and brazed? Could tube be used and bulged in a die? Or, should some other method be employed?

Revere, working with the design engineers of the Balford Corporation, exchanged ideas, weighed the pros and cons of various methods; experimented. They found that by using 70/30 Revere Brass Tube in a light anneal temper, it would take the bulging in the die satisfactorily and at the same time show up well as far as grain size control was concerned. By this method, complicated and costly forming operations and brazing could be eliminated, production speeded and the shell formed without any unsightly seam. Also, no extra hand finishing would be necessary before plating.

Perhaps one of the many types of Revere Brass or one of the other Revere Metals or Alloys can help you improve your product—cut your production costs. Why not tell Revere's Technical Advisory Service about your metal problems? Call the Revere Sales Office nearest you today.



UPPER LEFT shows brass shell of the Rev-O-Lite as it comes from the bulging die. Without any extra finishing, which would have been necessary had shell been made of strip and brazed, shell is chrome plated as shown at lower left. At right is the completed assembly of the Rev-O-Lite ready for action on the roofs of all kinds of emergency vehicles such as police patrol cars, ambulances, fire trucks, etc. Chrome finish base is of cast zinc alloy.

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COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Los Angeles and Riverside, Calif.; Rome, N. Y. — Sales Offices in Principal Cities, Distributors Everywhere.

Men in the News

(Continued from page 25)

United States Rubber Co., L. H. Gilmer Div.—Appointment of Wilbur E. Combs as product manager was announced.

Caterpillar Tractor Co.—To staff the new Plains sales division, the following promotions have been announced: Kenneth F. Ames, former head of sales training, will become sales manager; Lee Morgan, former supervisor of agricultural advertising and recently dis-

trict representative in New York state, and Gordon Fowler, former Eastern sales div. assistant, will serve as assistant sales managers. Former district representative, E. A. Tiarks, will become assistant sales manager, Western div., and W. F. Jordan, also a former district representative, will become sales manager, Eastern div.

Westinghouse Electric Corp.—The appointment of A. M. Harrison as

manager of the DC Engineering Dept. of the company's Transportation and Generator Div. at East Pittsburgh has been announced, succeeding Clarence Lynn who has recently undertaken important engineering responsibilities at the company's Atomic Power Div. H. C. Coleman was named manager of the company's industry engineering dept., with headquarters at the East Pittsburgh div., succeeding F. R. Benedict, who was recently assigned new duties with the company's Atomic Power Div. S. A. Haverstick has succeeded Mr. Coleman in his former position as manager of the marine and aviation section, industry engineering dept.

Westinghouse Air Brake Co.—Edward O. Boshell, prominent utility executive, was elected chairman of the board, president and a director of the company and its subsidiary, The Union Switch and Signal Co. A. N. Williams, who has served as president of both companies has been elected vice-chairman of the board of the two organizations. Herbert A. May was named senior vice-president.

Republic Aviation Corp.—Joseph Andreini, former production manager, has been appointed factory manager.

Dearborn Gage Co. — Walter C. Foote was appointed sales manager.

Federal-Mogul Corp.—The advancement of Walter E. Thill to assistant chief engineer has been announced.

Borg-Warner Corp.—Paul J. Larsen, former Director of the Office of Civil Defense of the National Security Resources Board, has been appointed assistant to Roy C. Ingersoll, president.

Packard Motor Car Co.—David S. McNally has been promoted to the post of manager of the newly-consolidated service parts warehouse and central inventory control program.

Allegheny Ludlum Steel Corp.—Dr. R. A. Lincoln has been appointed manager of the sales development and engineering service department, succeeding William B. Pierce who was named technical director. C. R. Mitchell, formerly assistant to the manager of stainless steel sales, has been appointed manager of stainless strip sales. R. S. Robinson, who had served as assistant to the general manager of sales, has been named to the newly-created position of manager of carbon steel sales.

Joseph T. Ryerson & Son, Inc.—Robert C. Ross, vice president in charge of operations, has retired.

Wrought Washer Mfg. Co.—Charles H. Disch, vice president and director of purchases, retired recently.

Highest Precision HARDENED & GROUND PARTS

THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud has to be right—every feature is. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.

Henry W. Brown
PRESIDENT



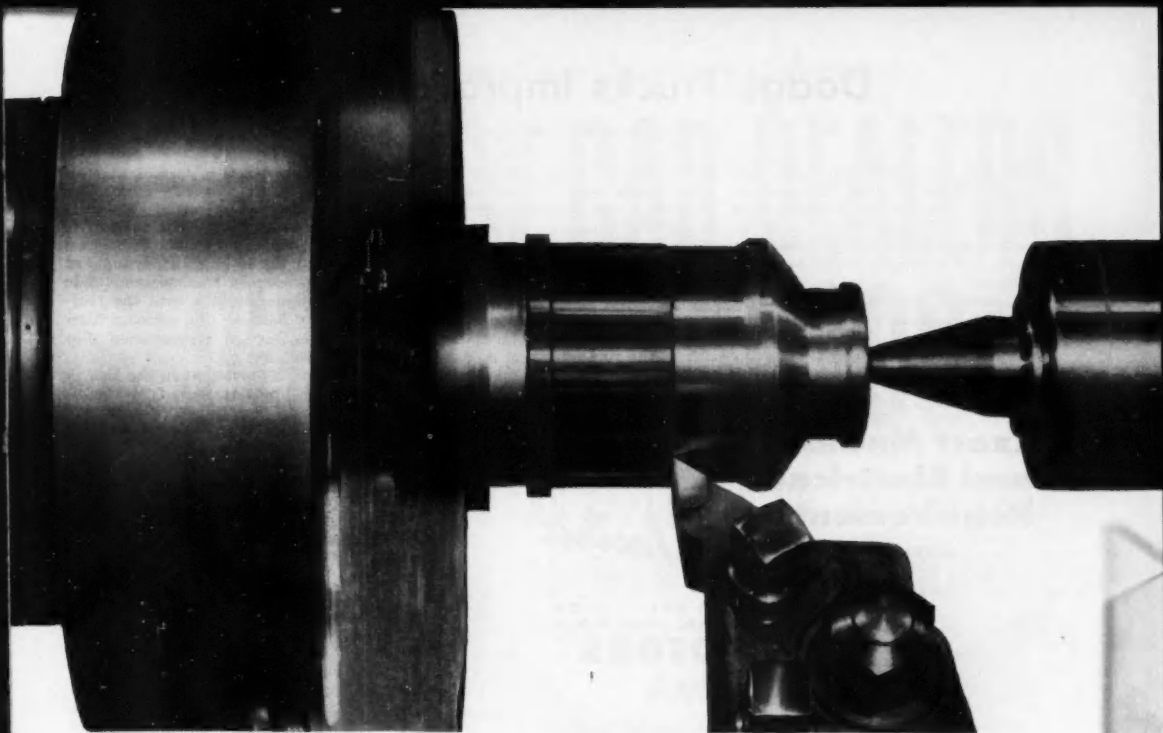
Parts Include . . .
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Shackle Bolts
Shackle Pins
Brake Anchor Bolts
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Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
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**Modern Turning Equipment Can
Literally Turn Red Ink To Black**

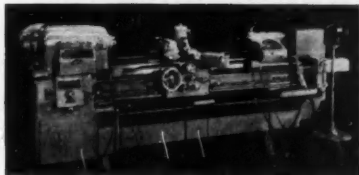
In thousands of turning operations, American business is today burdening itself with needless cost. That's the high price of obsolescence—a "hidden tax," so to speak, levied on the efficiency and economy of our industries.

This "hidden tax" is the all-important consideration that we bear in mind in creating modern Monarch Lathes. **THEY MUST DO BETTER WORK FASTER!** And as these typical examples prove, they do! One customer reports

a savings in labor costs, for the first year only, amounting to 49½% of his lathe cost. Another, a reduction in tooling costs on one job from \$4220 to \$187—along with a cut in setup time from 28 hours to 46 minutes. Big reductions in spoilage are reported consistently, and so are reductions in subsequent grinding operations—some up to 50%.

Don't these random instances suggest strongly that you take a new "Costs-Eye" view of turning?

Study the cost-facts of your turning operations. Then ask a Monarch representative to review your findings. If better turning is the answer to your problems, Monarch has that answer now... *The Monarch Machine Tool Company, Sidney, Ohio.*



Monarch "Series 60" Engine Lathe, with Air-Gage Tracer Packaged Unit Controls—an automatic cycle machine convertible to and from normal lathe operation in a matter of seconds. Monarch has built fine lathes since 1909—3 types of tracer controls beginning in 1930.



FOR A GOOD TURN FASTER TURN TO MONARCH

Dodge Trucks Improved for '51

(Continued from page 46)

duced with twin carburetion and twin exhaust system, carrying out the features first proved in the Y engine some time ago. However, where the R engine is used in the RS-229 school bus chassis, the single-carburetor set-up is continued.

In addition, certain detail changes have been made in some of the eight engines for better temperature control and elimination of hot spots. The top edge of cylinder bores on the intake

valve side has been rounded off; exhaust valve seat inserts have been deepened; and exhaust valve guides changed to bronze.

On twin carburetor engines Dodge provides three fuel filters, two oil bath air cleaners, and two velocity governors. Short intake manifolds run between each carburetor and individual intake ports to assure equal distribution of the fuel mixture. A "balance" tube connects the two intake manifolds

to equalize pressure in each carburetor-manifold system.

The clutch set-up on B, C, and D models is of interest. With fluid drive the 10-in. clutch is standard; without fluid drive, the 10-in. clutch is supplied with a three-speed transmission, while an 11-in. clutch comes with the four-speed transmission. An optional four-speed synchro-shift transmission also will be available.

A major improvement in the ride in B, C, and D models comes from the introduction of Oriflow shock absorbers which are similar to those adopted for the entire Chrysler Corp., passenger car line.

Brakes have been improved throughout the line, one feature common to all models being anodized brake cylinders to resist rust and corrosion. On all models from 1½ ton up a new type of lining is used. This Cyclebond, molded tapered lining greatly reduces the tendency for brakes to grab or squeal. It is said to give smoother, more even action with better stopping ability.

A vacuum booster is available on medium tonnage and is standard on high tonnage models. Air brakes are available on all high tonnage models and are standard on the VX and YX six-wheel models.

All the new Dodge trucks are equipped with an independent parking brake on the rear of the transmission. On the B and C models the linkage has been redesigned to give more positive action. On H and HH models the parking brake is larger and more effective.

Front axle and steering improvements on B, C and D models include worm and roller steering gear, larger diameter king pins while the D model has a heavier and more rigid tie rod. Many models of 1½ ton and up also have the new worn and roller steering gear to provide easier steering with less wear.

Many trucks of 2½ tons or larger have increased rear axle ratings to provide adequate capacity for the increased GVW and GCW ratings.

To provide greater strength F models have a deeper frame. Frame reinforcements are now available as extra equipment on G, H and HH models.

Other mechanical features of interest are: On G models with 192-in. wheelbase, the two-piece propeller shaft has been replaced with a three-piece shaft to reduce noise and vibration. On the Power-Wagon the mounting angle of the two-speed transfer case has been changed to improve propeller shaft angularity. Moreover, the case is now rubber-mounted to reduce noise and vibration.

Apart from the mechanical features outlined briefly above, the new B-3 Series of Dodge trucks feature new

(Turn to page 116, please)

Exact Mechanical and Electrical Requirements

WITH

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS



Intermittent high torque motor with low weight factor; for aircraft and many other applications.



Geared head motor with low output shaft speed for many slow speed heavy-duty drives.

More and more design engineers are turning to Lamb Electric special application motors to secure the exact mechanical and electrical characteristics required for optimum product performance. Lamb Electric specially engineered motors often make possible — reduced product weight, compactness, improved appearance and lower cost, along with efficient and dependable operation.

Our engineering department will be glad to work with yours in obtaining these results. The Lamb Electric Company, Kent, Ohio.

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER

MOTORS

Recent Gasoline Survey Shows:*

95% OF NEW CAR DEALERS PICK BLUE SUNOCO

AS "EQUAL TO" OR "BETTER THAN"
PREMIUM PRICED GASOLINE...



Actual Ratings

*As based on ratings of 1,903 new car dealers after they had tried Blue Sunoco

24%... "Much better"

20%... "A little better"

51%... "Equal to"

5%... "Not as good"

**BLUE SUNOCO SAVES YOU AND YOUR
CUSTOMERS UP TO 2¢ PER GALLON
OVER PREMIUM PRICED GASOLINE!**

NEW CAR DEALERS

New Car Dealers know that Blue Sunoco not only gives car owners high anti-knock engine performance, but saves them money over premium priced gasoline.

Sun Oil Co., 1608 Walnut St., Phila. 3, Pa.



THE HIGH TEST GASOLINE THAT SELLS AT REGULAR GAS PRICE!

here's ACCURACY



SIMONDS
ABRASIVE CO.

grinding wheels



Whether you measure grinding accuracy by Profilometer readings or comparison with master samples of ground surfaces, it's yours with Simonds Abrasive Company wheels. Why? Because Simonds wheels are accurately specified in correct grade and grains for your specific operations . . . accurately tested under conditions of actual use . . . and manufactured under complete Simonds control from crude abrasive to finished wheels.

Write for free Data Book describing Simonds Abrasive grinding wheels, mounted wheels and points, segments and abrasive grains. Also request name of your nearest Simonds Abrasive distributor.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

styling both inside and out. A new grille formed by two horizontal louvers has wide spaced headlights located in the top of the grille panel. Large parking lights directly beneath the headlights are designed for the addition of flashing turn signal lights at the owner's option.

Visibility has been improved by lowering the front end of the hood to give a view of the road close to the vehicle and by repositioning of windshield wipers so they will wipe a larger area.

Under-hood accessibility has been greatly improved on conventional models by removing the radiator tie bar and fastening the hood prop to the dash. This gives a clear and unobstructed working space under the hood.

Longer Course for 1951 Economy Run

(Continued from page 56)

will be marked by the Contest Board, AAA, on vibration dampener or flywheel. With engine running slower than the starting curve of the distributor advance (after distributor curve has been set), any timing later than the AAA mark may be chosen. The exact final timing position must be noted for the records of the Contest Board.

Performances of cars again will be determined by the "ton mile per gallon" formula established by the American Automobile Association. Under this plan, which insures every car an equal chance regardless of size, weight or price, the weight of the car and passengers is multiplied by the mileage and divided by the number of gallons of gasoline consumed.

Competitive classification of each car entered in the run (Special Classes excepted) is based on the factory retail delivered price for the lowest priced standard four-door sedan of each model, plus Federal excise tax, cost of standard equipment, conditioning and handling charges.

A de luxe model may be used but in no way does its use change the competitive classification. In order for a car to be considered as a different model, it must have a different engine and/or a different wheel base.

Accelerate Output of Lockheed F-94

Stepped up production of Lockheed F-94 all-weather jet fighters was announced by Robert E. Gross, company president, who disclosed USAF orders for a greatly increased number of the planes. Production rates and numbers cannot be disclosed but the output will be sharply accelerated under the new orders, assuring production of the F-94's well into 1952, Mr. Gross said. The company's backlog of aircraft is now approximately \$450 million.



12 Examples of Cost Cutting
made possible by combining
different operations in a YODER
Roll-Forming Production Line

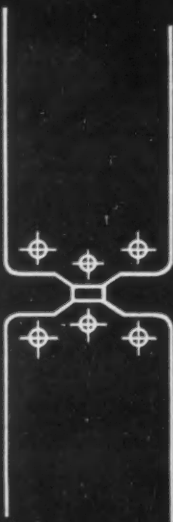
NO. 10 Notching; Punching Holes; Stamping Name; Roll Forming and Cutting-to-Length

Here's a steel channel, the main part of a patented mirror support—a big improvement on the conventional wood strips for fastening mirrors to the backs of dressers and other furniture. The first three operations are done on the flat strip, as shown in drawing below, in a Yoder automatic shear type press, placed between the coil box and the Yoder roll forming machine. After forming, the finished shape is cut-to-length in a Yoder Automatic Cut-Off Machine.

All five operations are performed continuously, in a line of four units just mentioned, tended by a single operator. The speed is 60 f.p.m., equivalent to a net production of about 3000 pieces per hour.

Yoder roll forming production lines may also include auxiliaries for embossing; coiling or curving; making overlapping, open or closed seams; welding; inserting rubber or felt; filling powders, or injecting liquids into tubular sections, etc.

Yoder engineers are at your service, without cost or obligation, in working out production problems involving such operations. Send for 88-page Book of Information on Cold Roll Forming.



THE YODER COMPANY • 3553 Welworth Avenue • Cleveland 2, Ohio

Complete Production Lines

- ★ **COLD-ROLL-FORMING** and auxiliary machinery
- ★ **GANG SLITTING LINES** for Coils and Sheets
- ★ **PIPE and TUBE MILLS**—cold forming and welding



News of the Industry

(Continued from page 23)

NPA Bans Use of Nickel in 300 End Items

The use of nickel in the manufacture of more than 300 end items in nearly two dozen general classifications has been banned by the National Production Authority through amendment of the original nickel order (M-14). This action is in addition to the original limitation of non-defense nickel to 65 per cent of the base period average. Four

kinds of metal, nickel bearing stainless steel, high nickel alloy, nickel silver, and nickel plate, are affected by the order and the effective dates are April 1 for the first two and March 1 for the latter two.

Automotive items covered by the ban include: Stainless steel—clad bumpers, clad panels, grills, hardware, horn rings, hub caps, steering wheel spoke wire, trim, wheel rings and covers, and mufflers (except for heavy duty equip-

ment); high nickel alloy — antennas, battery cables, hub caps, exhaust gaskets and manifolds, and windshield wiper blades; nickel plating — dash panels, accessories, gas caps, horns, grills, gravel guards, interior trim, lamp housing, license plates, name plates, radiator trim, wheel disks, and window levers, but not bumpers, bumper guards, hub caps and screws where no suitable substitution can be made. Agriculture and farm equipment: All implements including hand tools, ensilage cutters, feed troughs, bins and cribs, silos and spreaders. Stainless steel is also banned for making trim and decorative parts for railroad cars as well as for making trim, rigging, ventilating shafts, and galleys for pleasure boats.

New Production Developments Being Readied

Unique production developments, some not yet ready for complete disclosure, are turning up at an accelerated rate throughout the industry. One example is a tube mill, of the type used for producing tubing for shock absorbers and other automotive parts, in which the welding station is of induction heating type. A large unit of this type is already in operation in a steel mill. What we have in mind are applications for smaller mills, promising an appreciable increase in productivity.

Some unusual developments are promised in the production of crankshafts. A prominent crankshaft source has resumed work on welded crankshafts, and expects to make crankshafts for large engines by forging a number of small sections and welding them together. This promises major economies in die costs, billet cost, and overall cost. Many crankshafts now have shot-peened fillets. One producer, however, is experimenting with induction-hardened fillets. Objective in all cases is to increase physical properties and endurance limit by the simple expedient of suitably treating these critical areas.

See Only 20% of Factory Equipment Convertible for War Output

At a recent press conference held by Chrysler Corp., K. T. Keller made a statement of great significance to manufacturers and government planners. He said that only about 20 per cent of installed manufacturing equipment could be converted for producing military materiel. This was a concept subject to considerable misunderstanding just at the start of World War II because many prominent labor leaders succeeded in convincing government officials that all automotive manufacturing facilities could be readily converted to war work. Despite the confidence placed in the statements of labor leaders at the time, the fact is that not more than 25 per cent of machine tools in major automotive plants (Turn to page 120, please)



Sicon Formerly MICO

Silicone-Base High Heat-Resistant Finish

PROTECTS THIS PRODUCT AGAINST TEMPERATURES OF 870° (F.)



The interior parts of this miniature inferno are SICON-coated.

☆ It takes an unusual finish to withstand the constant high heat generated by the combustion chamber of the Superflame Floor Furnace, made by the Queen Stove Works, Inc. Yes, SICON lengthens the life of this unit because it does not break down like ordinary finishes due to its amazing stability under high heat. SICON is the first commercially priced silicone base finish that can be applied by brush, spray or dip and which either air dries or adapts itself to any existing force drying system.

Write for data.

Manufactured exclusively by

MIDLAND Industrial Finishes

Waukegan, Ill.

ENAMELS • SYNTHETICS • LACQUERS • VARNISHES

SNYDER MACHINES CONTROL Costs

*26 Years of Successful Cooperation
with Leading American Industries*

TYPICAL INDUSTRIES USING SNYDER-BUILT MACHINES

Aircraft
Automotive
Railroad
Refrigeration
Farm Equipment
Coal Mine Equipment
Electrical Manufacturing
Pharmaceuticals
Glass Manufacturing
Food Processing
Valve Manufacturing
Oil Producing

SNYDER TOOL & ENGINEERING CO.

3400 E. LAFAYETTE, DETROIT 7, MICHIGAN

were actually used for war production, the remaining equipment was stored and mothballed.

"Hardtop" Convertible Popularity Grows

Approximately seven per cent of GM's passenger car production last year consisted of the "hardtop convertible" model. Total production of the rigid steel top cars with no center door pillar was 211,223 units. This model has become increasingly popular since its introduction two years ago by Buick, and now nearly all manufacturers offer such models.

British Extend "Covenant" Period on Car Purchases

With the British government decision to continue the limitation of 110,000 passenger cars and similar vehicles for the home market, British manufacturers and dealers have decided to extend the covenant period to two years. Under this arrangement, the purchaser of an automobile is not allowed to sell until the vehicle has been in his possession for two years. This, it is believed, will abolish the rather extensive system of purchasing with the intention of reselling. There is to be a tightening up of regulations covering privileged per-

sons, including doctors, veterinary surgeons, and midwives. If these persons have already received a car since the end of the war, they will not be supplied with another unless there are exceptionally good reasons for doing so. The "covenant" does not apply to trucks.

British Car Makers Trying to Raise Money for Test Track

Definitely handicapped by the absence of a high speed test track, or roads on which sustained high speed can be maintained, British manufacturers are endeavoring to raise nearly half a million dollars to construct a track around the proving ground at Lindley, operated by the Motor Industry Research Association. At present, when high speed testing is necessary, cars have to be sent abroad, generally to the Continent, since France, Italy, and Germany all possess tracks and high speed roads. The British government has declared that it is prepared to give favorable consideration to the scheme and will contribute to the cost to the extent of \$140,000.

Four-Doors Preferred by Export Market

The export director of an automobile company doing more than the average foreign trade has an interesting comment about the influence of tradition and custom on body styles. He says that in certain countries four-door sedans are greatly preferred to two-doors because with prevailing cheap labor most automobile buyers employ a chauffeur. Obviously, the owner does not want to be seen riding in the same seat with his driver, and he much prefers the ease of entering the rear seat of a four-door sedan.

Ford and Hudson Establish Washington Offices

Ford and Hudson have established offices in Washington to handle defense contract business. Ford has assigned Gerald J. Lynch, formerly assistant director of the company's office of defense products to head its new office. He will be assisted by John F. Cooney, formerly Washington representative on defense products. Hudson has named John J. Murphy to head the Washington office of its government contracts departments. He formerly was international representative of Avco Manufacturing Corp.

Government Increases Cold Rubber Output

The government is shifting the emphasis on its synthetic rubber production program to the so-called "cold" rubber. Production of that type is to be expanded by another 120,000 tons a (Turn to page 122, please)

Chicago RIVET "912"

AUTOMATIC RIVET SETTER

CUTS COSTS 3 WAYS

- 1 FASTENS FASTER . . .**
Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.
- 2 DOES WORK OF SEVERAL MACHINES**
Quick change rotary hopper and race-way makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.
- 3 SAVES ON MAINTENANCE . . .**
The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

If your assembly calls for 3/16" steel tubular rivets or smaller, of 3/4" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.

FREE CATALOG
 contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.



Chicago Rivet & MACHINE CO.
 9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois
 Branch Factory: Tyrone, Pa.

*How many
different
sleeve bearing
alloys do you use?*

We specialize in variety . . . in sleeve bearings and bushings. Half a century's experience has shown us that there is no universal bearing alloy to fit all needs. One automotive engine, for example, might require tin base lining for main bearings, while another might require copper-lead lining. One tractor manufacturer calls for cast, full-round piston pin bushings while another prefers rolled-type split bushings. Electric motors, Diesel locomotives, marine engines and ditch diggers all have their own special requirements. Instead of making just one type of bearing and trying to fit it to all needs, we produce "tailor-made" bearings to meet your performance specifications.

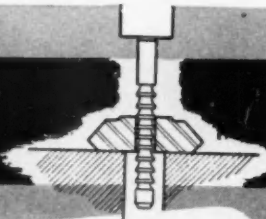
Our six manufacturing plants are equipped to produce sleeve bearings and bushings in a wide variety of material combinations, and in many sizes—in quantities ranging from dozens to millions.

FEDERAL-MOGUL CORPORATION • 11037 SHOEMAKER, DETROIT 13, MICH.

Silent SLEEVE BEARINGS

OVER FIFTY YEARS OF CONTINUOUS BEARING EXPERIENCE

HELPFUL HINTS ON INCREASING BROACH LIFE



Page C-4

OILS FOR BROACHING

HEAVY DEMAND ON CUTTING FLUID

Broaching places a great demand on the cutting fluid due to the large amount of metal being removed and the necessity for maximum broach life and finish.

Stuart's THREDKUT and related products, due to their high effective sulphur content, have been outstanding for the most severe broaching work. Active or effective sulphur in an oil serves as an anti-weld agent preventing metal seizure, welding and scuffing.

SLOW SPEED BROACHING

For unusually slow speed broaching of ferrous materials it is often desirable to use oils of heavier viscosity (such as THREDKUT #25) that will not drain off of the broach and the work before it has completed its mission.

GOOD RULE OF THUMB

When excessive front clearance wear is observed on the cutting teeth of the broach, DECREASE active sulphur in the oil by diluting with paraffin oil or other blending oils. When poor finish is encountered due to pick-up and welding, apply Stuart's THREDKUT or THREDKUT #99 straight.

USE OF WATER-MIX CUTTING FLUIDS

On some flat surface broaching and on round hole work it is often desirable to use a water-mix cutting fluid of top quality. Stuart's SOLVOL, a heavy duty "soluble" oil, is widely recommended.

QUICK
FACTS!

PROOF!

"With their regular oil they only broached 12 pieces when the broach wore badly and bugged. This is a 4140, 240-270 Brinell forged gear blank with a 1" hole and 1/4" deep keyway to broach at one pass with a combination broach, 1' for the round hole first, followed by 2' for the keyway.

"They put in THREDKUT #99 and the broach was still in good condition after running 1500 pieces." WRITE FOR LITERATURE and ask to have a D. A. Stuart representative call.

D. A. Stuart Oil Co.

2733 S. Troy Street, Chicago 23, Illinois

year to bring total annual capacity to 340,000 tons. The expanded production of cold rubber will not mean any increase in total synthetic rubber production, which remains at a goal of 760,000 tons a year.

Publications Available

(Continued from page 54)

A-42 Grinders

Norton Co. — A recently issued pamphlet illustrates and describes a new 10 by 20 in. universal grinder. The seven important features as well as other interesting data pertaining to this new tool are listed.

A-43 Microcasting

Austen Laboratories, Inc. — A unique folder describing many precision casting applications, called a "File on Microcasting Case Histories," has just been published.

A-44 Valves

Ross Operating Valve Co. — A new technical bulletin, designated #303, has been issued by the company to describe its 1/4 in. and 3/8 in. 880 Series Hand and Foot Valves.

A-45 Production Tools

Scully-Jones and Co. — Standard production tools manufactured by the firm are described and illustrated in 11 new catalogs. These new catalogs replace the Scully-Jones Tool Engineering Manual 500 and any other literature previously published.

A-46 Electrolytic Cleaning

The DuBois Co. — The firm is offering a revised and enlarged edition of its electrolytic cleaning booklet "An Introduction to Electrolytic Cleaning."

A-47 Punches

Wales-Strippit Corp. — Brochure M introducing, illustrating and describing the Wales multiple hole punching system is now available.

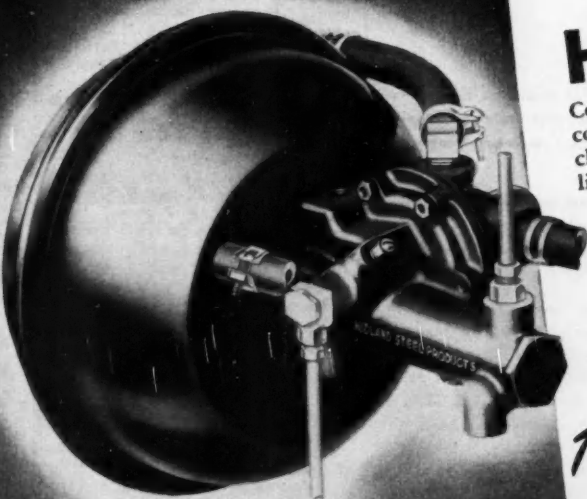
A-48 Strip Chart Recorder

Wheelco Instruments Co. — Bulletin C2-2 describing the company's Capacilog line of electronically operated strip chart recorders has just been released. A separate price list supplements the bulletin.

A-49 Jolt Pin Lifters

SPO, Incorporated — A new four-page illustrated catalog, No. 30, which presents detailed information and specifications on the six standard models in the SPO Series 3000 line of jolt pin lifters is now available.

Two Great MIDLAND BRAKING SYSTEMS



AIR HY-POWER

Air-over-hydraulic in its simplest form.

- Fewer parts
- New simplicity
- New compactness
- Less weight
- Lower cost
- Sealed system—protected from atmospheric conditions.

Midland Air Hy-Power is supplied as a unit or in our packaged kits.

Investigate and compare!

VACUUM HY-POWER

Combines three time-tested parts in a single completely enclosed unit: Vacuum diaphragm chamber—hydraulic vacuum valve—hydraulic slave cylinder.

- Direct applied power—positive braking
- Not affected by weather conditions
- Easy to install in any hydraulic system.

Furnished for replacement, or in Midland complete kits.

Write or phone for complete information about Midland Power Brakes.

The
MIDLAND
STEEL PRODUCTS COMPANY

6660 Mt. Elliott Ave.

Detroit 11, Mich.

Export Department: 28 Pearl Street, New York, N. Y.



Air and Vacuum
POWER BRAKES



World's Largest Manufacturer of
AUTOMOBILE and TRUCK FRAMES



Air and
Electro-Pneumatic
DOOR CONTROLS



Nash's New Plant for Rambler Bodies

(Continued from page 37)

The Bonderite dry-off oven is of single-zone type, 96 ft long, held at a temperature of 350 F max. It is fed recirculated air at the rate of 22,500 cfm, and exhausts air at 6000 cfm.

Next major operation is prime spray, this being handled in a prime spray booth of down draft type, with a length of about 80 ft. From here the bodies are transported to the prime oven which is 360 ft long, held at a temper-

ature of 350 F max. This oven is of three-zone design.

All bodies are routed to the wet sand deck, then run through the wet sand drying oven. It is 146 ft long, held at a temperature of 350 F max.

Next in sequence is the color spray booth, another outstanding unit of down draft type, having a length of around 100 ft. Drying is done in the color oven which is of three-zone de-

sign, 371 ft long, held at a temperature of 260 F max.

Bodies requiring two-tone color are taken off the main line, suitably masked and put through the two-tone color spray booth. This, too, is of down draft design and runs about 40 ft in length. Bodies then go through the two-zone, two-tone oven which runs 200 ft in length, and is held at 260 F max.

The three spray booths mentioned above were installed by Binks Mfg. Co. and represent the latest version of such equipment. An enormous volume of down draft air is required to provide a clean and comfortable atmosphere for the operators, the air being filtered twice and heated by direct gas fired burners. Moreover, the battery of three booths requires fresh water at the rate of 15,000 gpm for the water wash. Condensed data on this equipment will be found in Table II.

All of the spray booths provide excellent seeing through an installation of fluorescent light sources. The color booth has a supply of 16 standard colors, piped individually and circulated from the mixing room in the service basement.

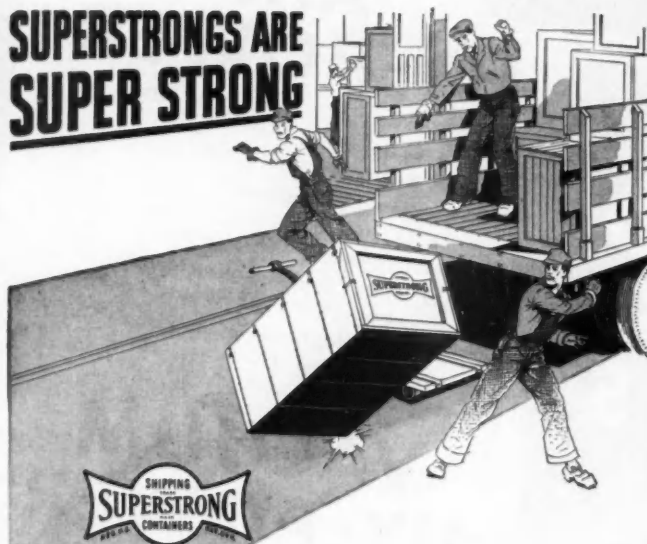
All of the drying ovens described above were installed by Ross Engineering Co. Temperature control is held precisely by an installation of Leeds & Northrup potentiometer recording controllers for each zone. All oven control instruments are grouped in one location so that the paint supervision can see at one time and place all the operating data of the paint department. Conveyor chain speed in all ovens, except two-tone, is 10 fpm, two-tone being held to five fpm. Significant data on the ovens will be found in Table II. It is of interest, too, that all equipment is heated with natural gas burners.

Following completion of paint operations, bodies go directly to the start of the trim line. Painted body storage conveyors are used only for emergencies and scheduling of ovens. In this area the trim line conveyor system is traversed by the seat and cushion conveyor on which the work is completed ready for installation in the bodies and is scheduled by a Telautograph system which is broadcast at the start of the trim line.

The trim line, incidentally, is provided with the major share of the Bull-Dog trolley duct system which distributes power to the portable tools used along the conveyor.

Referring again to the second floor plan, it is of real interest to note how skillfully the prime, color, and two-tone drying ovens have been extended into the areas between the original test cells to take advantage of floor space outside the building which is ordinarily waste space.

SUPERSTRONGS ARE SUPER STRONG



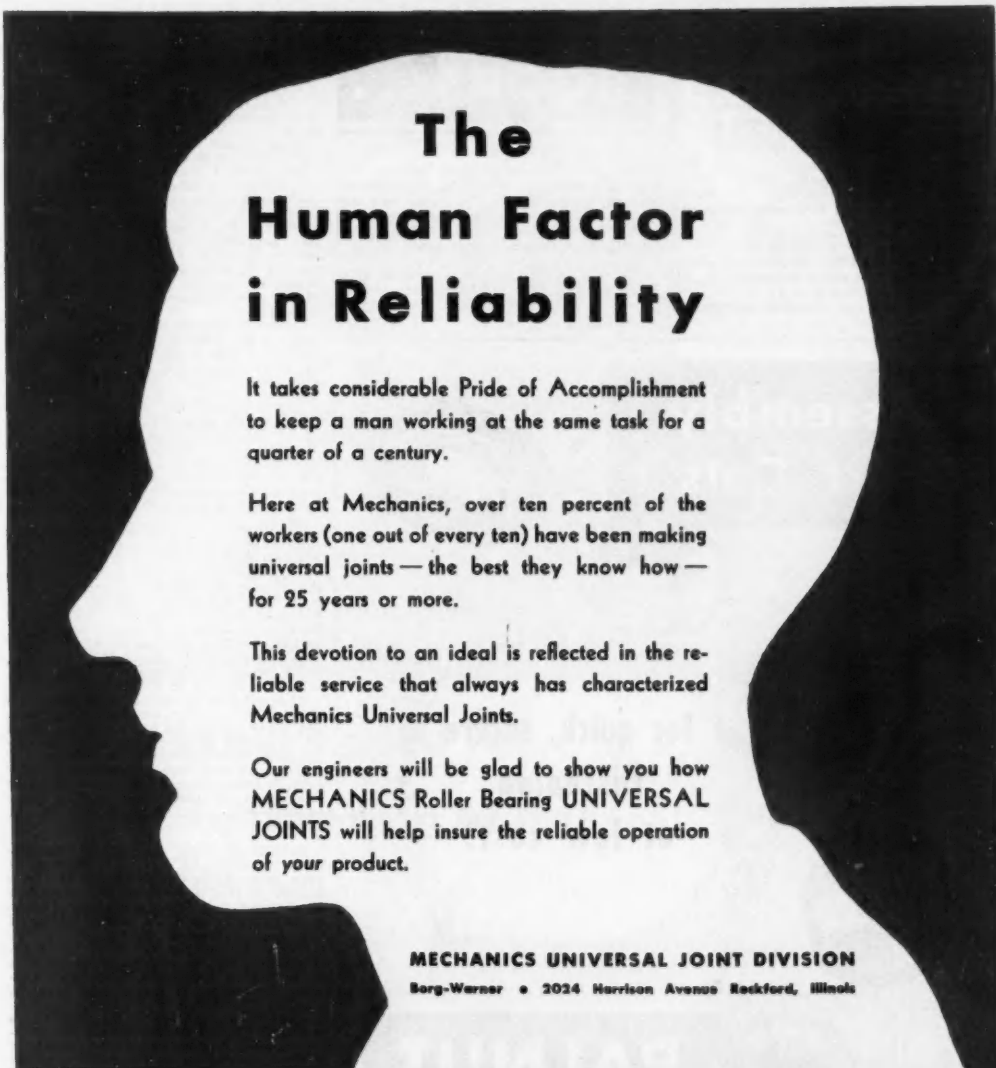
WIREBOUND BOXES and CRATES
WOODEN BOXES and CRATES
CORRUGATED FIBRE BOXES
BEVERAGE CASES
STARCH TRAYS
PALLETES

Nearly a century of experience has resulted in the design and construction of shipping containers which give maximum strength and protection.

SUPERSTRONG boxes and crates - wire-bound, wooden and corrugated - incorporate special features which provide increased efficiency and protection at a reduced overall cost.

Your product will receive individual attention, so that a SUPERSTRONG container may be custom built to its particular specifications. A SUPERSTRONG representative will call when you request to make a thorough analysis of your shipping requirements.

RATHBORNE, HAIR AND RIDGWAY BOX CO.
1440 WEST 21ST PLACE • CHICAGO 8, ILLINOIS



The Human Factor in Reliability

It takes considerable Pride of Accomplishment to keep a man working at the same task for a quarter of a century.

Here at Mechanics, over ten percent of the workers (one out of every ten) have been making universal joints — the best they know how — for 25 years or more.

This devotion to an ideal is reflected in the reliable service that always has characterized Mechanics Universal Joints.

Our engineers will be glad to show you how MECHANICS Roller Bearing UNIVERSAL JOINTS will help insure the reliable operation of your product.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Avenue Rockford, Illinois

MECHANICS

Roller Bearing

UNIVERSAL JOINTS

For Cars • Trucks • Busses and Industrial Equipment

TINPLATE HANDBOOK, by W. E. Hoare, published by Tin Research Institute, 492 West Sixth Avenue, Columbus 1, Ohio. Steelmaking and tinning processes used in the manufacture of both hot-dipped and electrolytic tinplate are summarized and the factors which determine the suitability of the various types of tinplate for any particular application are discussed. Major uses of tinplate, test methods, coating thicknesses, and lacquer adhesion are briefly described. Gauge and conversion tables are also included.

A WORLD AIRLIFT, by Elvira K. Friedman, published by Funk & Wagnalls Co., 153 East 24th Street, New York 10, N. Y. Price \$2.85. Outlining the needed preparatory

BOOKS...

steps already taken by both Eastern and Western blocs of nations for the eventual establishment of the United Nations Air Police Patrol, the book provides a practical and immediately available plan for the organization of such a police force.

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Petroleum Products and Lubricants (with related information) brings together in compact, readily usable form, most of the A.S.T.M. standards, test methods, and specifications widely used in this field. (The tests for knock rating of engine fuels and certain sampling and volume measuring standards are issued in special manuals and not included in this compilation.)

This edition gives in their latest form 135 A.S.T.M. standards, including 112 test methods; eight specifications; three lists of definitions relating to petroleum, specific gravity, and rheological properties of matter; two tentative recommended practices for the purchase of uninhibited mineral oil for use in transformers and in oil circuit breakers; and for designating significant places in specified limiting values; and other material.

Copies of this 780-page book can be procured from American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., at \$5.50 each, heavy paper cover; \$6.15, cloth cover.

SYMPOSIUM ON PLASTICITY AND CREEP OF METALS—This symposium covers four outstanding phases of this subject—the plastic deformation and flow of metals—presented at the First Pacific Area National Meeting of ASTM in 1949; and provides in compact form a considerable amount of pertinent information and data.

The papers and their authors are: *The Experimental Exploration of Plastic Flow in Sheet Metals*—L. R. Jackson and W. T. Lankford, Battelle Memorial Institute; *Forming Parameters and Criteria for Design and Production*—William Schroeder, Lockheed Aircraft Corp.; *The Use of Creep Data in Design*—H. C. Cross and L. R. Jackson, Battelle Memorial Institute; *Super Creep-Resistant Alloys*—J. W. Freeman, D. N. Frey, E. E. Reynolds, and A. E. White, University of Michigan.

This publication should be of much interest to all metallurgists, design engineers, and those fabricating parts and equipment where plastic flow and the effect of temperature are important considerations.

Copies of this 72-page symposium (STP 107), in heavy paper cover, can be obtained from American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., at \$1.50 each.

KINEMATICS OF MACHINES, 5th Edition, by Gaillet & Church, published by John Wiley & Sons. Price \$4.00. The fifth edition of this well-known text book has been revised and extended by Prof. Church in an effort to make the subject matter of still greater interest and clarity for the student. The chapter on velocity and acceleration has been rewritten and contains an article on Coriolis' acceleration. Similarly the section on gearing has been revised in accordance with current methods of generating gear teeth. All illustrations are new. The tabulation method for locating instant centers, a revised proof of Klein's construction, tabulation for epicyclic trains, as well as a section on epicyclic gear trains with no fixed member, all represent additions. New material on the pressure angle of cams, selection of cam motion, and methods of manufacturing cams also has been provided.

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AUTOMOTIVE INDUSTRIES, February 15, 1951

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OSBORN power brushing is being used widely by industry on many diversified applications of cleaning or finishing metallic and non-metallic parts. On the work shown below, Osborn power brushing mechanically cleans strip steel prior to electrolytic tin plating.



Continuous sheet scrubbing line at a leading rolling mill.

The continuous sheet scrubbing line in this rolling mill is a vital link in its over-all operation. Any interruptions become extremely costly since they tie up other lines, disrupt production schedules and lose precious man-hours.

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Correction

In the Studebaker V-8 Engine Plant article appearing on pages 46, 47 and 48 of the February 1 issue of *AUTOMOTIVE INDUSTRIES* there was a transposition of captions for the illustrations. Caption 1 refers to illustration 2; caption 2 refers to illustration 8; caption 3 refers to illustration 1; caption 4 is correct; caption 5 refers to illustration 3; caption 6 is correct; caption 7 refers to illustration 5, and caption 8 refers to illustration 7.

Investigation of Spontaneous Freezing Temperatures

Although many important advances have been made in the control of ice formation on aircraft in flight, little progress has been made toward an understanding of the fundamental processes involved in the formation of ice or the prediction of such formation.

Because the presence of supercooled water in the atmosphere is primarily responsible for aircraft icing, it is necessary to know the properties of supercooled water for a complete understanding of the icing process. Although supercooled water has been observed and reported for over two centuries, considerable disagreement exists as to the degree of supercooling possible and the factors that influence supercooling.

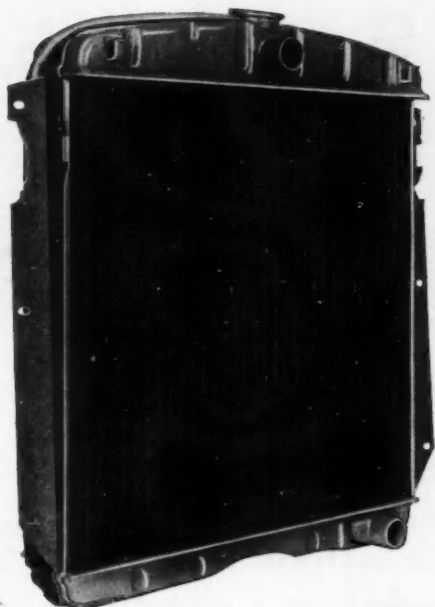
The purpose of an investigation conducted at the National Advisory Committee for Aeronautics Lewis Laboratory, and described in NACA Technical Note 2142, was to study the spontaneous freezing temperatures of droplets within the size range encountered in a supercooled icing cloud in order to determine size dependency. The freezing temperatures of 4527 droplets condensed on a platinum surface and 571 droplets on a copper surface in the range 8.75 to 1000 microns in diam were observed. Photographs were taken through a microscope at one-second intervals and a corresponding record of the temperature was made.

The size, the length of time below the melting point, and the spontaneous freezing temperature of each droplet were recorded and the following results obtained. 1. The average spontaneous freezing temperature for each size decreased as the droplet size decreased for the entire range investigated. Below 60 microns, the decrease in the spontaneous freezing temperature with decrease in droplet size was particularly marked. 2. The frequency of occurrence as a function of the freezing temperature of droplets of a given size provided a distribution curve with a well-defined peak frequency. 3. The spontaneous freezing temperature of a given droplet tended to be the same on successive freezings. 4. No droplet froze spontaneously at a temperature above 20 F, but all droplets melted at 32 F.

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COMPLETELY ENGINEERED **Cooling System**



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AIRBRIEFS

(Continued from page 52)

war production, affording it an unbroken earnings opportunity, there was scant conversion of the wartime aircraft industry to peacetime products during the past five years. The aircraft manufacturing industry is rapidly taking unto itself a reputation of "famine or famine" and the source of military aircraft production seems no longer to be solely the aircraft industry but the entire gamut of the nation's industrial potential.

The Thinkers Commence

The Truman Administration's tentative step into a socialization program for the aircraft industry, called harmlessly the "Prototype Bill," ran into difficulty from the start but finally got a toe-hold in the form of a \$12.5-million authorization from the 81st Congress. The U. S. Prototype Advisory Committee, meeting in Washington, has

issued the first phase of its projected program and has allayed many fears by announcing what amounts to a "study and observe" period for the present. The Committee, made up of Government and trade association representatives, has decided to obtain a North American B-45 and a Boeing B-47 jet bomber to be used over a regular airline operating schedule in order to obtain statistics for further study in the feasibility of turbo-jet-powered commercial transport operation. Secondly, it has "urged" the conversion of as many piston-engined transport types as possible to turbo-prop power to afford an opportunity for more studies of their economic possibilities. Thirdly, it wants to "refine" its "DC-3 replacement" specifications, which always seem to come out as a DC-3! And, fourthly, it has decided to "survey" all existing transport planes for possible conversion to gas turbine engines.

This program, from one end to the other, is one the industry is perfectly capable of doing by itself and without any assistance whatever from Government planners. The industry's only interest in the Prototype idea from the beginning was its offer to Government funds to foot at least a large part of the \$10-20 million bill for design and construction of a brand new gas turbine transport. The rest of the many ideas advanced were cold-shouldered by the industry as a threat to its economic independence. Apparently none of the money is now intended for this simple purpose but, typically, will go for "studies," "planning" and the countless other budget entries of a Government program. There is presently only one hitch in all these proceedings: the 82nd Congress hasn't appropriated the \$12.5-million and won't even take up the matter until June at the earliest, by which time assuredly all of the original reasons for the whole idea will have been long lost in the shuffle.

Arms Aid Begins

The first shipments of production U. S. aircraft to foreign countries since V-J Day have begun with initial deliveries of Republic F-84E Thunderjet fighters to member MDAP nations. These airplanes are not war-surplus nor even slightly used, but are coming directly off the assembly line at Farmingdale, Long Island. Three Thunderjet fighter groups of the USAF are already in Europe (one in England and two in Germany) and technical representatives of MDAP nations are already on duty studying maintenance and operating techniques of these aircraft. Foreign pilots are being sent to the U. S. for USAF familiarization pilot training on the new airplane. Thunderjet shipments will be made to Norway, France, Italy and Holland and upwards of 1000 aircraft are involved. (Turn to page 132, please)

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Special electric alloys centrifugally cast for extra dependability.

Although negotiations continue toward a production of the Thunderjet by France and Italy, the present system of having the parent Republic Aviation Corp. do the building and the foreign countries do the flying is assuredly the soundest approach to the problem. Initiation of foreign production of the aircraft would create far more headaches than it would solve and the only argument in favor of such an idea seems to be that it would save the delivery time and cost across the Atlantic. France and Italy are having enormous difficulty getting any sizable production on their own products and, even on the Rolls-Royce turbojet engines

being built under license, it seems illogical that the problems would be any lessened by bringing a "foreign" airplane into the strategic material-skilled worker-experienced management jumble of these native programs.

Extra-Curricula MDAP

While all the high-level formal MDAP activities proceed at the various capitals of the world, a "little MDAP" seems to be going on in Korea.

The No. 2 South African Air Force squadron in Korea is already flying North American F-86 Sabre jet fighters an average of 20 sorties a day, although no details seem obtainable on just how they came by these exclusively USAF airplanes.

NEW PRODUCTS

For additional information please
use coupon on page 54

(Continued from page 96)

C-57—Multi-Purpose Impact Wrench

Full production on a new portable electric impact wrench has been begun by the Mall Tool Co., Chicago, Ill. This tool applies and removes screws, studs and nuts up to 3/4 in. bolt size. Model 2EW will also drill, tap, ream and extract broken capscrews or studs, as well as drive wood augers, hole saws and wire brushes. Designed for easy one hand operation, the 11 in., 7 lb. unit is



Mall impact wrench, Model 2EW.

good for close quarters. A new pistol grip and trigger switch allows better control and instant response.

Model 2EW is powered by a reversible, air-cooled universal motor for operation on 115 volt ac-dc current. A model for 230 volts is also available. The impact hammer is mounted on an anti-friction bearing that eliminates kick and twist in the hand. Housing is made of die cast aluminum alloy.

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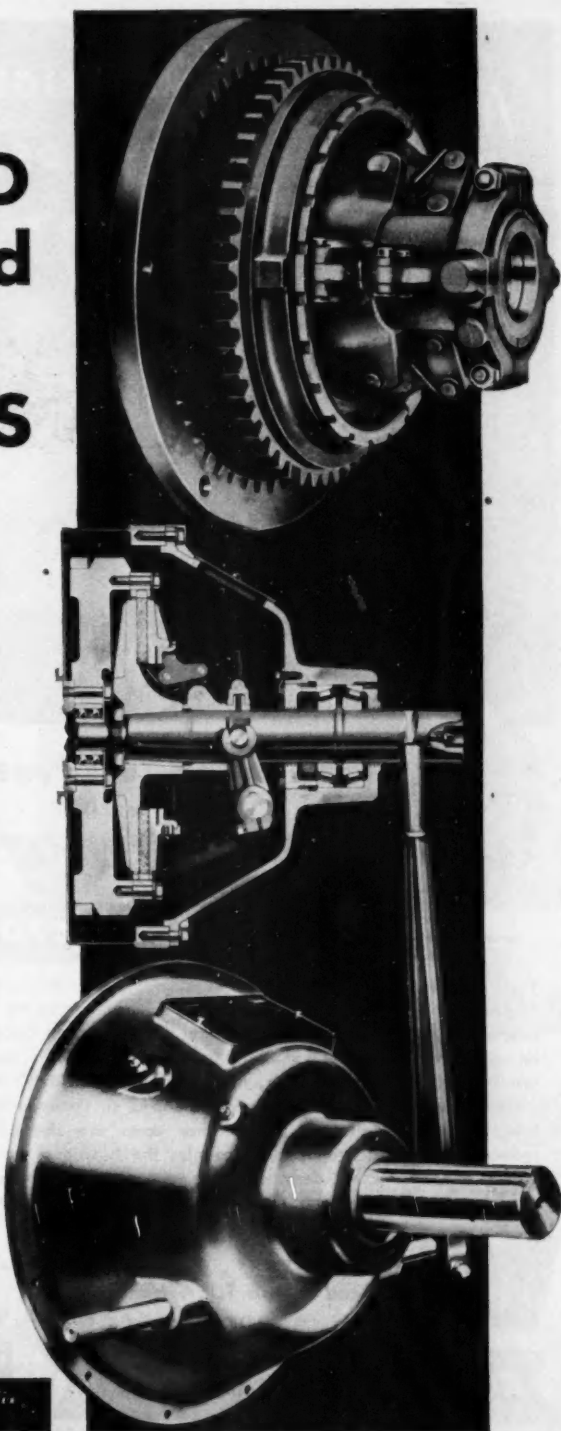
This newly developed, simplified heavy duty type clutch uses fewer parts, thus can be produced at lower cost. Its design provides for cleaning and cooling through air circulation between the clutch body and pressure plate. Centrifugal action is offset by the toggles being anchored nearer center of the shaft. Self-engaging tendency is overcome by a new toggle lever design. Pressure is spread evenly over the entire friction surface. Accurate balance insures smooth operation. Sizes fit in standard S.A.E. flywheel housings. Convenient adjustment requires no special tools.

Send for This Handy Bulletin

Gives dimensions, capacity tables and complete specifications. Suggests typical applications and makes helpful recommendations for planning efficient power take-off drives.

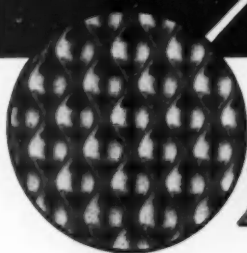
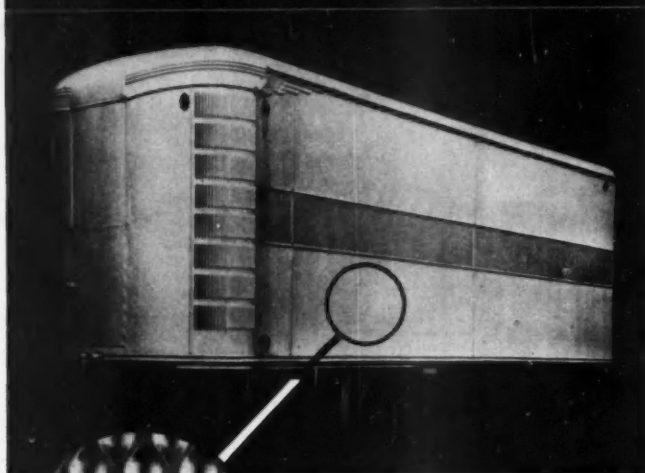


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New AIRCRAFT PRODUCTS

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R-15—Thermoplastic Flame-Resistant Sheet

United States Rubber Co., New York, N. Y., announces a new flame-resistant Royalite thermoplastic sheet material which will not support combustion, intended for use in airplanes and other applications. Delivered in flat sheets in several standard sizes, it is made in four standard colors and five grains.

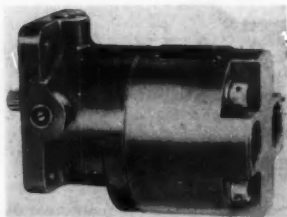
In airplanes, the new material is considered practical for interior fairways, instrument boards, cable covers, covers for protruding instruments, hood frames for wing tip lights, window frames, etc.

In addition to being flame-resistant, it is extremely tough, highly resistant to impact and light in weight, and can be easily formed into simple or compound shapes. It is non-corrosive and stable under changing atmospheric conditions, with exceptional electrical insulating properties and low rate of heat conductivity and water absorption. It will not chip or warp, is easy to clean, stainproof, greaseproof and mildewproof.

R-16—400 Cycle AC Air Compressor

Designed for maintaining "sea level" pressure at 50,000 ft in radar and electronic plenum of aircraft, model RG-8160-1 air compressor put out by Lear, Inc., Elyria, Ohio, is equipped with an ac motor of 1/5 hp, 115 volts, 400 cycle, single phase, 4 amps, 7,200 rpm. The minimum capacity at 50,000 ft is 80 cu ipm while maintaining 32 in. Hg absolute pressure. Sea level capacity is 1,750 cu in. of free air per min.

This air compressor is designated Type HD-70/U by the Air Force. Principal use is the pressurizing of radar installations in aircraft, maintaining



Lear-Romec air compressor. Model RG-8160-1 USAF Type HD-70/U.

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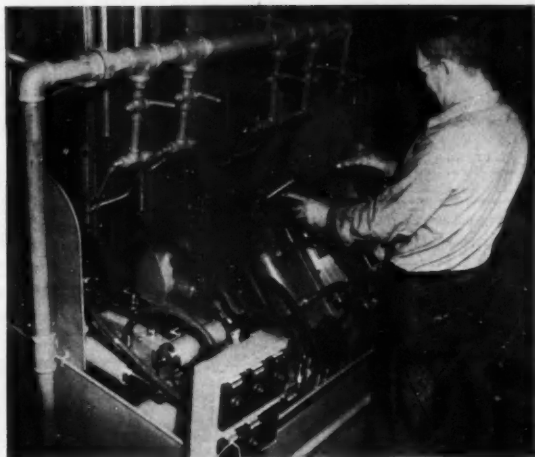
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SIMPLE LOADING plus AUTOMATIC CLAMPING gives the manufacturer of these connecting rods and caps **BALANCED PRODUCTION** at the rate of 300 complete assemblies per hour.

The installation, engineered the American-way, consists of a Standard American 10-ton, 42-inch stroke vertical duplex hydraulic broaching machine and two, two-station fixtures mounted on completely automatic tilting-type work tables. Fixtures are interchangeable. One station on each fixture holds a rod part, the other a cap. The operator simply **PLACES** a rod and a cap on the first fixture . . . then pushes the control buttons. The parts are **CLAMPED AUTOMATICALLY** while the table tilts down and then broached. While one assembly is broached the operator loads the other fixture.



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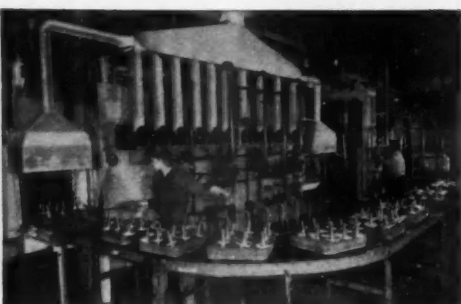
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an atmosphere of dry and oil-free air.

Unit has a service life of 1,000 hrs with no decrease in performance. Sliding blades of rotary pump are self-lubricated Graphitar (carbon-graphite composition) which assure positive starting and pumping at -87°F . Total weight with outlet check valve 5.1 lbs.

R-17— Hot-Cold Test Stand



Hot-cold test stand built by Electro Mechanical Devices.

Latest addition to the EMDCO line of testing equipment built by Electro Mechanical Devices, Division of George L. Nankarvis Co., Detroit, Mich., is the hot-cold test stand, capable of producing any temperature between -70°F and $+230^{\circ}\text{F}$.

The hot-cold test stand is said to be the solution to one of the problems of many manufacturers of aircraft components. Producers of aircraft parts are frequently required to determine operating characteristics of sub-assemblies at temperatures equivalent to those encountered in actual flight conditions. These temperatures, which range from a high of 230°F to a low of -70°F are now available in the hot-cold test stand.

Designed for testing small aircraft parts, the test stand has a deep well which can accommodate parts measuring up to 6 in. by 6 in. by 8 in. The item to be tested is placed in the deep well and the deep well chilled or heated to the selected temperature. The part under test assumes the temperature of the deep well and can then be withdrawn and checked for operation.

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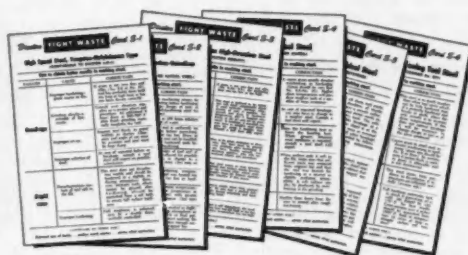
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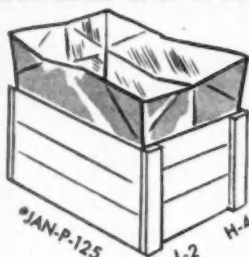
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lated in a closed system a short distance from the test stand in insulated lines.

Compact, durable and mobile, the hot-cold test stand measures only 30 in. by 40 in. by 54 in., is completely self-contained, and requires only power and water supply. Electricity and cooling water are conducted in flexible conductors to maintain mobility.

Incorporated into the test stand are many safety and automatic devices, such as, totally enclosed motors, automatic relief valves, explosion-proof electrical components, etc. Refrigerant used in the system is a metho-ethanol solution and can be easily serviced in the field.

R-18—Liquid Cleaner For Acrylics

A liquid cleaner for use on acrylics such as lucite and plexiglas is available in quantity from Schwartz Chemical Co., Inc., New York, N. Y. Called Rez-N-Kleen, it is said to solve the problem of removing masking tape and other foreign matter from lucite and plexiglas, as well as from ordinary glass. The manufacturer recommends it for fast and efficient cleaning of transparent acrylic aircraft sections such as windows, side blisters and turrets and gunners' domes.

R-19—Instrument Panel Vibrator

A compact instrument panel vibrator has been devised by the Safe Flight Instrument Corp., White Plains, N. Y., to put the "shake" back into jet aircraft instrument panels. Currently, a quantity are being produced for installation in the Boeing B-47 stratojet bomber. The company points out that, contrariwise, shock-mounted instrument panels have been standard for years in aircraft to overcome damage from vibration. But the problem was reversed when jet propulsion caused aircraft to fly so smoothly that altimeters, air speed indicators and other instruments which are gear-operated, registered erratically. They lagged because there was not sufficient vibration to overcome gear friction.

The new Safe Flight panel vibrator weighs only 11 oz. is less than 4½ in. long (4 15/32) and is 1½ in. square. Hermetically sealed with an inert gas, it is impervious to corrosion or dampness.

A small electric motor, operating on

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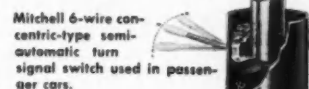
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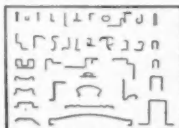
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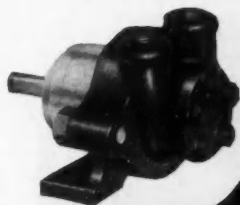
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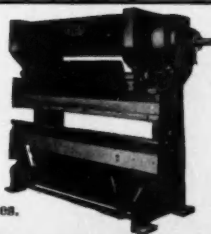
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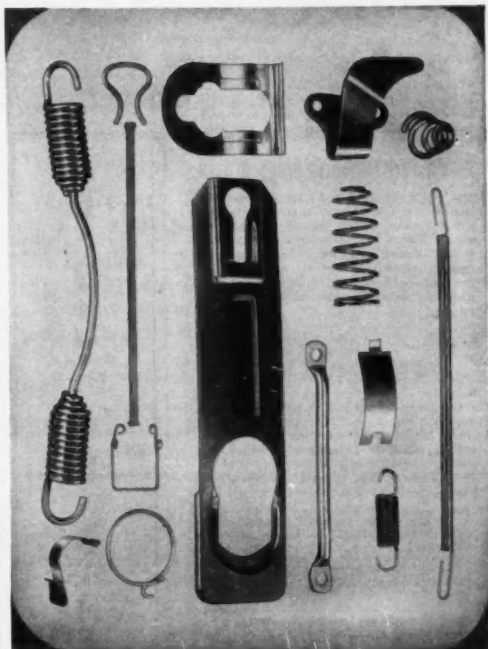
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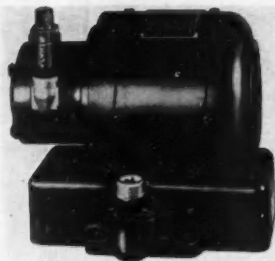
27 volts with maximum continuous current drain of 0.04 amps, turns a small eccentric weight at a frequency between 2000 and 3000 rpm. It is filtered to prevent radio interferences according to ANM-10-A specifications. Mounting can be accomplished anywhere on the instrument panel by four bolts.

Development of the panel vibrator is declared a natural outgrowth of the Safe-Flight control stick shaker used on many jet fighters as part of the Safe Flight pre-stall warning instrumentation system.

R-20—Pneumatic Emergency Canopy Actuator

Pneumatic motor model RD-7440A for aircraft, designed by Lear, Inc., Elyria, Ohio, is used as an emergency canopy actuator on fighter planes, in case the electrical canopy actuator is inoperative. The pneumatic motor is highly adaptable to many actuator applications requiring rotary motion of the prime mover.

Motor is gear type of 0.310 cu in. displacement, rated for 1500 psi air pressure and tested for running torque of 25 in. lbs under conditions of limited energy taken from a 52 cu in. tank pre-



Lear-Romec pneumatic motor, Model RD-7440A.

charged with compressed air at 1050 psi. Speed may be effectively varied by controlling air feed to motor. Torque is proportioned to input air pressure.

Light weight of 1.5 lb is maintained in production motors through use of precision parts in aluminum body. Only moving parts are the two impeller gears which run on needle bearings. Motor is reversible. Drive shaft has splined connectors and uses no shaft seal or packing. Escape plugs vent air leakage away from the drive shaft. Mounting flange takes adapter for special installations.

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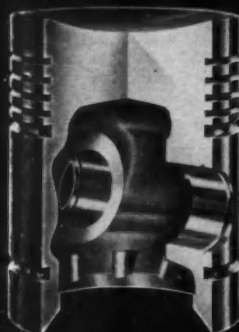
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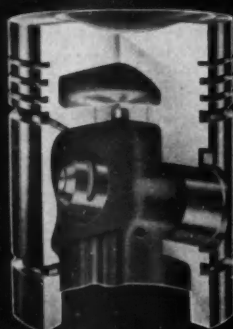
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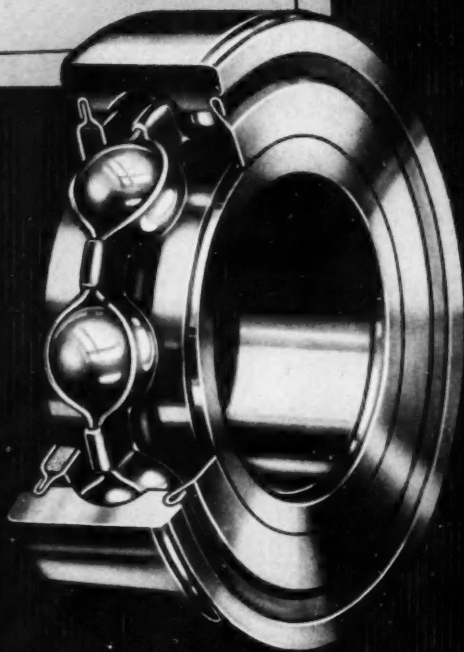
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